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ABSTRACT

In this report of a project to research existing industrial training of basic skills are provided an overview of the project and examination of four aspects associated with training. Part 1 is a detailed account of the search procedure that located and reviewed literature on basic skills training industry. A bibliography of the sources found in the search is provided. Section 2 is a review and analysis of the sources identified in the search covering four aspects of industrial training: theory of training, examples of training programs, problems in training, and processes in training. Figures representing 10 training models appear. In the concluding comments a proposed theory of industrial training is discussed and a schematic model for program construction is provided. Appendixes include four essays written mid-way through the project on aspects of training (flexibility, organizational climate, culture, literacy) and an interim evaluation report. (YLB)

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FINAL REPORT

310 PROJECT

PROTOTYPES FOR TEACHING BASIC SKILLS
IN
BUSINESS AND INDUSTRY

By

ALAN H. COOPER

RESEARCH COORDINATOR

JUNE, 1981

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FOREWORD

Research into existing models of instruction in industry, whether job or basic skills related, is difficult because of the nature of industrial training. Industries may provide glimpses of their training, but the actual processes used, created by teams of professionals in education and industrial technology, are proprietary. A company which invests much time and money in training is hardly expected to share its products with competitors, or the public. This report, then, can only hint at the complexities of training, while showing that research on the specific topic is not, from this vantage at least, feasibly undertaken. The product here presented is a source list of references, and topics in education in industry which may benefit those who are also beginning such study.

The report is presented in two parts. Part I is a detailed account of the search procedure, and a bibliography. Part II covers topics in this area, chosen because of the material found and dependent upon them. It is hoped that this report will provide some background information, as well as point out the problems associated with research in new areas, where availability of hard process data is uncertain.

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Part I

Research Procedures

Bibliography

The goals of the project are given as:

1. Research existing models of training in business and industry;
2. Develop designs and collate materials for basic skills improvement in business and industry;
3. Establish basic skills prototypes for use by both educational and industrial agencies at a local and national level.

Products to be developed are:

1. Identify existing businesses and industries with exemplary employee training components.
2. Analyze exemplary business and industry training models.
3. Consolidate process and material findings into a new training model for basic skill adaptation.
4. Establish a portfolio to include model and target groups.
5. Develop procedures for dissemination of the portfolio on a local and national level.

Literature and Contacts

The initial, and on going, step was locating and reviewing extant literature on the subject of industrial training, with an intent of finding the process information called for in the goals. This was conducted through the use of four strategies.

1. The researcher made a hand search of the ERIC indices, Resources in Education and Current Index of Journals in Education, for the past fifteen years, under a variety of descriptors, for documents and articles.
2. A hand search was conducted on The Lockhead AIM/ARM data base, as well as INFORM, for the past ten years.

3. The Education Index was searched for the past ten years.

4. A computer search of the ERIC, AIM/ARM and LABORDOC data bases was conducted, using general descriptors on labor education and inplant training. There were no resources listed when these terms were combined with basic skills, or any of the individual areas of basic skills.

The result of this search revealed twenty-four articles or monographs which apparently dealt with the subject. None of these provided specific process information for specific companies. Further confirmation of this lack of information was provided by faculty in Technology Education at West Virginia University, who indicated that they had not heard of such a study, and opined that such process information as existed would be limited to descriptions of the "what" of training, and the "why", but not the "how".

The next step was a hand search for books in the West Virginia University library including a search of Books in Print. The six found were supplemented by one from Dr. Robert Sharps, Assistant Superintendent for Curriculum, Ohio County Schools, entitled Business-School Partnerships: A Plus for Kids (NSPRA, 1980). This provided two examples of training, and in basic skills, Atlas (AT&T), and Illinois Blue Cross and Blue Shield. Further searches included other indices, The Reader's Guide and its components on business and industry, and newspaper indices, especially The New York Times.

Contacts with persons involved in training then proceeded. As mentioned above, the Technology Education Department of West Virginia University was consulted, since it occasionally provides training.

The department's focus, however, appears to be training of trainers. The Business School was also contacted, particularly the Office of Business Research. The information provided was no knowledge of such programs as this, and none on basic skills training in industry. Finally, the Mining Extension Service said that basic skills training for miners was a part of training in the early decades of this century, since miners often had little schooling, but that now there was no coherent approach to this need.

From the information gathered and reviewed, a list of eleven people or organizations which might supply more data on processes was developed, and letters sent. The list included:

1. The Pennsylvania Northwest Tri-County Intermediate Unit;
2. The Allegheny Conference on Community Development;
3. The Chamber of Commerce of the United States;
4. The C & P Telephone Company;
5. The National Association for Industry - Education Cooperation;
6. The Northwest Regional Education Laboratory, for the National Experience - Based Career Education Association;
7. The Conference Board, Inc.;
8. Illinois Health Care Service Corporation;
9. The National Center for Research in Vocational Education at Ohio State University;
10. The Work in America Institute; and
11. The Center for Education and Work of the National Manpower Institute.

Of these, six responded. Follow-up letters produced no new additions. Those responding were: The Pennsylvania Northwest Tri-County Intermediate Unit, which provided the names of local educators working on curriculum guides to improve basic skills in the school; The Allegheny Conference or Community Development, which coordinates private enterprises in local development projects, such as roads, health, and education; The C & P Telephone Company, which will be detailed below; The Northwest Regional Laboratory; The ERIC Center for Vocational Education Research, which provided aid in conducting computer searches and brochures on recent publications; and the Work in America Institute, which sent copies of reports on training. The material provided, although helpful, was not on the process information needed, nor could any responder indicate persons or sources of such process material. The one exception, presented to point out the single largest problem in this research, was C & P Telephone. The Staff Manager of the Continuing Education Program, James Pavlakis, fully described the "what" of C & P training, but declined to give the "how". He indicated the belief of all industry that training programs are developed by industries at a large cost, and developed in response to specific industry needs. Considering the competitive nature of industries, the turnover in employees, and the cost of producing materials, it is not appropriate for industries to give out their process information. Mr. Pavlakis' reasoning is supported by other contacts which show the proprietary nature of process information.

At this point, it became clear that specific process data would not be available in the scope necessary to determine exemplary training models (Objective I). Numerous capsule descriptions of programs are available, but they only provide the "what" and not the "how". Further definition, if possible, of the research needed to be made. What has emerged from the reading of the materials given below are specific concerns in training. These are described in Part II. The project shifted its emphasis, then, to process information on training itself. This was done to:

1. Provide background material for future training work;
2. Investigate what process information is available;
3. Define better the details of training, especially those where the schools may be involved, such as;
    a. Task analysis;
    b. Basic skill level needed for job proficiency;
    c. Methods of assessing job materials for requisite basic skill level;
    d. Methods of assessing employees to determine basic skill level;
    e. Methods to coordinate the basic skill level for jobs with those of employees; and
    f. Procedures to enhance business/industry - school cooperative activities in training.

Conclusion and Recommendations

The specific objectives of the project could not be addressed after it was discovered that industries refuse to disseminate their training materials. The project had to evolve a more general research scheme, which opened more avenues for background information, and detailed areas of job training where it may be profitable to include school expertise.

Recommendations based upon these findings are that;

1. The feasibility of a project be determined from at least a cursory literature review before the project is undertaken.
2. Considering the understandable reticence of industries to release process information, projects should focus on specific methods to aid industry in training.
3. For industries without training, workshops be held to indicate what the schools can do in terms of curriculum development and instructional methods.
4. In light of the common lack of coordination between businesses and schools, an organization with extensive contacts, such as a union, state department of training, or an existing vocational advisory council, be used as an intermediary. This organization would act as a clearinghouse, to channel industry's needs and school's expertise into common realms of activity.
5. The most appropriate and timely involvement of schools in industrial training is that concerned with basic skills. Two other areas of appropriate activity are aid in curriculum development and instruction.
6. The basic skills component is best noted through assessment and coordination of job requirements and employee skill level. The assessment and modification or creation of job materials is also included.
7. Curriculum development and instructional strategies must be based upon the concerns of industry for performance-based curricula, and the strategies most appropriate for trainers to use to change employee behavior to the most efficient.
8. Other concerns may include topics relating to life skills, or those concerned with daily living and functioning in the world.
9. A major outcome of this project has been a proposal to address the above recommendations (3-8).

Since the objectives could not be met as stated, these recommendations outline the aspects of research where results would be most likely to be obtained. As a project located outside of industry, it is necessary for the schools to create an infusion process, to duplicate as much as possible the activities of industrial training personnel in companies where such training is institutionalized. The schools may then become partners with industry in the creation of curricula while using the expertise of both agencies for the training and upgrading of employees. In this sense, the project has been able to point out methods for such infusion, and the reasons why research without a prior industry commitment to sharing of its products is not productive. The schools can be of great assistance to industry, but the barriers of mutual suspicion and divergent goals need to be broken before productive associations may begin. The clarity of the differences between schools and industries is apparent in the scope of the research indicated above, and in the lack of findings on processes in training.

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PART II

ASPECTS OF TRAINING

This section will examine four aspects associated with training, using those sources found in the search detailed in Part I. The aspects are: Theory of Training; Examples of Training Programs; Problems in Training; and Processes in Training. Because of the diffuse nature of the material, it appears that a review and synthesis technique will allow for detailed coverage, and will permit a concise series of points which emerge from the review. A beneficial example of this technique is a review used in this study (Wenig and Wolansky, 1972). It is hoped that such a technique will be helpful to those who are new to the study of industrial training, and to those who may need confirmation of the ideas frequently cited as common knowledge.

Theory of Training

There are several sources which detail the "why" of training, but as will be seen, there appears to be difficulty in one primary conceptual area, that of the difference between training and education. It is clear that any form of corporate training is motivated by profit, but the objectives of the training often show that simply providing repetitive practice in job skills is insufficient to effect employee job proficiency.

The difference between training and education is provided by some authors. Luxenberg (PDK 61, 1980) says,

> "Corporations, pressed to maintain skilled work forces, have been providing more and more of their own education and training".

The dichotomy is evident here. Education is a liberal pursuit. Smith (PDK 61, 1980), citing Cardinal Newman, says that education is thought, allowing the educated person to reason, analyze, make judgments, or discriminate. Schwaller (PDK 61, 1980) points out that education entails information, concepts, and intellectual abilities, while training is skill, achieved through repetitive performance. Branscomb and Gilmore (1975) see the distinction as a continuum, bounded by the two terms. Education is, "The exposure to contrasting assumptions and points of view, the involvement of personal intellectual initiative, less constrained range of use even to uncertainty about its specific utility, and the general impossibility of measuring on a quantitative scale the degree and quality of acquisition of insight." Training, however, implies "measurablity, narrowness of subject matter, relevance to a particular time and place, well-defined range of use, and efficiency of information transfer."

With this background, it becomes evident that there is considerable mingling of the two terms when training is discussed. Looking at stated goals of training, one can see where a given writer stands along the continuum.

Willard (1973) says, "The only justification for training is that it must contribute more to corporate earnings than it costs to conduct." Training is, then, measurable, in terms of:

> "(a) increased productivity or added operational capacity,
> (b) reduced errors and waste, including unnecessary training,
> (c) reduced operating costs, and
> (d) increased profits through sale of new services."

Willard also cites three additional goals: that management be trained to analyze training needs in terms of corporate needs and costs to conduct training; that trainers be trained to present what is needed cost-effectively; and that training be businesslike to improve the image of training.

Somers (1971) in a national survey of 176 employers, found these reasons for training; preparation of entry level employees; meeting current manpower needs; upgrading of current employees, and attraction of new employees. New programs recently added by those employers were in general training with no occupational aim, and 33% said that they would like to add more such general programs.

Schwaller (PDK 61, 1980) cites the needs in industry which produce training programs, saying they are:

> "1. To accommodate the turnover and growth in personnel;
>
> 2. To accommodate changes in knowledge and skills required by a company and its employees; and
>
> 3. To improve the skills and performance of present employees on their jobs."

Other reasons include: speeding the time to learn a job; maintenance of quality while increasing production; meeting of changes in company products; helping to elevate employee satisfaction and attitudes; and providing better opportunities for the future through remedial education.

The Director of C & P Telephone's Learning Center in Baltimore, James Pavlakis, gave the following rationale for training:

1. Mutual benefit to the company and its employees of a skilled work force who will remain with the company;
2. Constructive use of time and continuing interest in personal development;
3. A general enrichment of company resources.

Gardner (1976) reiterates the job proficiency and profit idea.

> "The objective of job training is to enable an employee to perform his job in such a way as to meet the standards of output, quality, waste control, safety, and other operational requirements. In short, the objective is job competency or mastery in its various operational phases. Of major concern are output (or efficiency) and quality requirements."

Lusterman (1975) agrees with the business need as impetus for training approach. He also says that training only peripherally addresses employee aspirations. Origins of needs include: determination of desired expertise and competencies; enhancement of employee morale; stability of the work force; increased attractiveness of the industry; and demonstrable commitment to minority workers.

In their review of literature on training, Wenig and Wolansky (1972) found that continued company competitiveness is the goal. To produce this, programs are created to achieve high productivity, reduced waste, less employee turnover, and high quality. Purposes of training are:

1. training of new workers;
2. retention of those already employeed;
3. promotion;
4. production of new products;
5. increased safety; and
6. accommodation to changes in production procedures.

Among these reasons are entry level training and retention of older workers. Reasons for such training are given, where the problem is the low quality of recent school graduates. For instance, U.S. News and World Report (87.3) says that companies are dissatisfied with the basic or job skill level of high school and college graduates. The problem may be with functional illiteracy, or with school training on out-dated equipment. Other surveys have found a similar situation. Brown (1979) shows that

35.6% of the labor force has less than an eighth grade education. Men under this level are 50.6%, and for Hispanics it is 50.8%. Johnston (1973) projects that upgrading of existing employees will be the primary problem in the next decade, where 41% will be lower than an eighth grade skill level. More hopefully, he says that such problems with younger hirees will diminish.

With this perceived lack of skill on several levels, entry training would appear to be an important goal. This is especially true if more and more young people apply for jobs without any skill. Several solutions are possible, including screening of applicants (Myers, 1971), but there may be either an insufficient supply of skilled workers, or a problem with the fairness, especially to minorities, of screening procedures. The most obvious solution is retention of existing employees through programs which increase morale as well as skill level. The humanization of training, then, is needed. Smith (PDK 61, 1980) sums this up:

> "In a time of diminished wealth and slowed growth, it is difficult to motivate the work force; thus fuel is added to the smoldering fire of reduced productivity. Turnover increases, adding immeasurably to production costs and inflation... (But) an employee chosen for training feels privileged and important, feels as though the company cares about him."

If the schools cannot provide applicants who meet standards of industry, then industry must take on the job. Gustaitis (1967) says,

> "Private industry, finding itself unable to fill more and more good jobs because too

> many employees and applicants are functionally illiterate, is beginning to provide its own remedy by teaching the three Rs. ... Industry's motive is economic - it is cheaper to buy a basic adult - education course and promote present employees than to find scarce qualified workers through a process of testing and elimination — but the social benefits promise to be substantial. Many of the workers are members of minority groups with poverty - level incomes."

He concludes,

> "Enlightened self - interest is leading private industry onto paths of social betterment once reserved for the schools and social-welfare programs. The motive may be profit, but the benefits...will be shared not only by the teaching firms and the employers but by the workers and the nation as well."

Further evidence of this thrust in training is given by Furlong (1968). With a large group of potential employees who are functionally illiterate, companies must begin hiring the formerly unemployable and training them in basic or daily survival skills, so they can enter and proceed along the job ladder. Furlong also cites the improved morale and increase in productivity resulting from such training.

Branscomb and Gilmore (1975) show the benefits of education in training.

> "In American industrial circles, there is an increasing concern over the intellectual vitality and, more importantly, the intellectual flexibility of industrial personnel. An accelerating pace of social and technical change clearly calls for some form of continuing education.... The larger corporations are increasingly concerned with viable techniques of management that contribute to stability of employment and continued employee effectiveness.... General concern for the well-being of employees throughout their careers accompanies the general

> trend toward benefits other than financial compensation. These concerns are bringing industrial education increasingly into elements of what is called a "liberal education".

There is evidence to show that both education and training occur in industry. Training has traditionally been the main impetus for such programs, in order to give employees specific job-related skills. The usual method was repetitive practice, and evaluation based on reduced waste, good quality, and increased production. In more recent times, expansion of the work force and declining skill levels, usually in terms of basic academic skills, have necessitated a redirection of industrial training to include areas traditionally held by the schools. What can be seen is a shifting of traditional education to include job skills, and a shift of industrial training to include general education. It would not be difficult to see that, depending on the industry, the training would be much like schooling.

The sources cited show a range of programs from strict job skill training to general education. However, the motive is always the same, productivity and profit. Short term skill training has been the accepted procedure. But, with rapid change comes rapid success or failure in competitiveness of companies, and thus change itself must be included in the training scheme. Keeping the same goals, industries have to adjust rapidly, and thus retrain employees rapidly, to maintain their ability to deal with competitors. The form of this change is now seen to include employee flexibility, which implies practice in the mental abilities needed to change and function in new environments. The faster this is accomplished, the faster the company can realign itself to meet change. The cost saving of speedy training and adjustment returns us to the goal of profit. As philosophers such as Cardinal Newman or A. N. Whitehead have said, and as John Dewey pointed out, the dichotomy between the useful and the liberal, or practical and aesthetic, or training and education, may not be as valid as presupposed.

If industry now sees the utility of providing non-work related education, and if the schools are also trying to provide more work-oriented instruction, why has there not been more union of the two? The enmity between the schools and industry has been shaped by the, possibly false, dichotomy of training and education mentioned above. That the schools have been heavily influenced by industry or corporate philosophies is undeniable (cf. Spring, Education and The Rise of the Corporate State (1972), or Callahan, Education and The Cult of Efficiency (1962)), but there remains the feeling that the two are separate in objectives. This may have been the case, and the schools certainly make no profits, but now it seems that industry is leading the way to showing how training and education may be offered to do what the schools have been attempting for so long. Of course, many other factors influence the types of learning which encompass each group, and here we are limited to a few ideas only. The fact remains that there is great change occurring, and it may be wise for schools to investigate how companies train within strictures of time and money.

It remains to summarize what has been found about industrial training. The goals of training are the goals of industry: profit, productivity, quality, competition. To reach these, companies conduct training to:

1. Increase employee job proficiency by:
    a. Increasing skills and/or providing training in new skills;
    b. Reducing waste and error, including non-productive training;
    c. Effecting higher morale, through survival skill training and training for advancement.
    d. Increasing safety.
2. Increase company profits by:
    a. Maintaining a pool of skilled workers;
    b. Reducing turnover and need for entry level training;
    c. Increasing production;
    d. Aiding managers and trainers in meeting needs on a cost effective basis.
3. Increase company competitiveness by:
    a. Using training as incentive for hiring/upgrading;
    b. Enabling rapid employee adjustment to new procedures;
    c. Retaining employees with skills.
4. Counteract the flow of poorly trained applicants, or remedy the deficiencies of minority workers.

Examples of Training Programs

There is a great amount of literature on training programs, usually in the form of capsule descriptions of exemplary models, or in the form of descriptions to point out various methods. In any case, it is not feasible to list them all, but it is helpful to cite programs to identify the range of activities possible, and to note the apparent reasoning behind them. This reasoning may then be compared to the principles given in Theories of Training.

It is clear that industrial training and education present as wide a variety of courses, workshops, or other forms of information transfer as any traditional educational system. Within such diffuse types, one sees the use of inhouse or outside resources, and scheduling on or off company time. Many differing instructional methods are used, as are instructional technologies. Such variety precludes any general description of training or education in industry, but some clear differences emerge depending upon the size of the company. Lusterman (1975) presents data which shows that the larger the industry, the more training takes place. Smaller (under five hundred employees) have much less since they cannot hire staff, or often purchase outside help, or give benefits to employees who take classes. For instance, 8% of the companies in the United States have over 10,000 employees. This 8% accounts for 60% of the private work force, and for 76% of the total expenditure for training and education. For the smaller companies, 500 - 999 employees, the smallest in the Conference Board survey as reported by Lusterman, the percentage of total companies is 42%, but they employ 7% of the work force, and devote about 3% to training. In terms of Adult Remedial Education; 35% of the largest companies provide courses, while 4% of the smallest do. When giving examples below, it should be noted that company size is a large determinant of type of training, or indeed the presence of any training at all. The impact of this for areas of small business concentration should not be overlooked, especially when we ponder the role of the schools in industrial education and training.

One principle cause of the diversity in programs stems from the twin precepts of training for immediate needs, and training for future needs. In each case, there are problems either in analysis or in prediction. The split between present and future can be seen in McClintock (in Branscomb and Gilmore, 1975), who shows the long history of this problem. The sophist idea says that educators should anticipate the future through foresight and patterns from tradition, and then train for that future. The Socratic aim says that the future is too uncertain to admit of anticipation, so educators should concentrate on the universals or absolutes of experience. This has resulted in emphasis on reading, writing, judgment, and computation. But, corporations cannot do all of these things, and most often the press of current needs dictate immediate remedies, to the detriment of the long range development of manpower.

With this and other implicit demands on corporate training time, already limited by the need to keep the company producing while training goes on, we may take a glimpse at various programs, noting the theory behind them, and showing again the diversity inherent in training from differing conceptions of needs and of the future.

The C & P Telephone Continuing Education office provides both on-the-job training and self-development education. Supervisors give about three days of training for clerical work and other jobs which rapidly become routine.* Off-the job, out of hours, training is devoted to self-improvement. From a centralized set of programs which have been created from specific needs, employees are recruited and given tuition aid to enhance their basic education. The ATLAS program for example, has flexible entry-exit, concentrates on reading and math, including vocabulary building, comprehension, and grammar, with topics in effective writing, oral communication and interpersonal skills, and human relations. The program is geared to small group work, with some laboratory and lecture. A one year growth can be obtained in twelve weeks.

Kimberly-Clark has developed an Educational Opportunities Plan (Rosow, 1980). The chief benefits of the plan are tuition assistance and flexibility. Any employee may enroll, not, as in some plans, management only. Employees are given an account

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* Use is made of various instructional strategies, including role playing, case studies, and simulations.

(c.$450 per employee) to spend on these activities. The requirements are lenient, and employees or their families may elect non-job related courses, cultural activities, or future career studies. The plan is administered to allow for counseling of employees, and availability of information on the plan, including the location of courses. Most course work, then, is done outside the company itself. As evidence of its success, the plan sponsored 35% of the employees, as compared to a national average of c.4%.

The Polaroid Corporation (Lusterman, 1975) has a five phase system for training and education. It uses outside course work, especially for management, at nearby schools and universities; it sponsors lectures for management using outside consultants; it uses company personnel in workshops on management, personnel, and business topics; it provides instruction in technical matters and remedial education using its own staff; and it brings in outside faculty on various topics.

As stated above, larger companies tend to have more inhouse activities. General Motors has its own college, where high school graduates are employed and spend five years in study and work. Degrees are granted in engineering or industrial administration. Emphasis is placed on technical subjects, as well as communication skills (U.S. News and World Report, 87.3, 1979). The Xerox Corporation also sponsors a college (Branscomb and Gilmore, 1975), the Xerox International Center for Training and Management Development. The program is primarily two-week intensive classes mostly on sales and service, with some management training.

AT & T (Luxenberg, 1980), as seen in part in the C & P Telephone summary above, operates on a local and regional basis training programs. Based on needs determined from customer comments, changes in procedures, or new facilities, courses are constructed and systematized, so that what an employee learns is applicable throughout the system. A Center for Technical Education, located at several places around the country, offers intensive work in specialized areas. The training and course work at AT & T uses such methods as case studies, simulation, or lecture with practice, and is oriented to the daily work of the employee.

These large companies can do most of their own training, especially important where systematization is necessary. But, as with Polaroid, the usual scope of training includes use of several differing approaches. Some of these may be examined through examples.

As part of federal mandates on the hiring of the previously unemployable, corporations were forced to devise or purchase training programs to meet the many needs of this group of new employees. Working with outside help, and with internal training staffs, some companies created model programs which they in turn packaged and sold to other companies. These programs include counseling, curriculum development, needs assessment, job placement, and training modules in a variety of instructional strategies, most commonly computer assisted or audio-visual. The advantages of these packages are: performance guarantees in contracts; continued use of programs within companies; the elevation of job prospects for employees already trained; efficient training; assessment of employees for jobs; targeting of training with skill shortages; preparation for job mobility and placement; and greater employee motivation. Chrysler Learning, Inc., a subsidiary of Chrysler Corporation, centers on entry level training in recruitment, training, remedial education, placement and trainer training. It also provides counseling in work attitudes, such as punctuality, habits, maintenance of quality, and attendance. The tenets of the training include: instilling of a readiness to work; encouraging of independence; rehabilitating before training; and providing of remedial, job-related, education.

RCA, in affiliation with Job Corps, offers vocational training in several areas, such as construction, health fields, clerical and business areas, and auto repair. They also provide remedial experiences in education, driver education, work attitudes, and personal hygiene. The RCA program has been effectively used in Dallas, where schools and industries combined to ensure that trainees would receive locally relevant instruction. The career education materials thus developed were packaged for schools' use.

Other such services are offered by Airco, Control Data, ITT, Singer, and the Northern Vocational Training Company. Typical services include program creation and management; curricular design; training in several vocational areas; and curricular packages of materials or manuals in an audio-visual or other format (You and Youth, Vocational Foundation, Inc., 1.5, October, 1979).

Besides specific types of job training, companies offer self-development courses. C & P Telephone's example has been given above. Others are given below (Bureau of National Affairs, Policy and Practice Series, No. 235). Youngstown, O. Sheet and Tube Company offers courses in speech, reading, steel making, and writing, and others on metallurgy, statistics, and industrial electricity. Classes meet once per week for sixteen weeks, and tuition, refunded after successful completion, is five dollars.

At the Office Products Division of IBM, programmed instruction courses are available, on one month loan, in job training, management, general education, and personal development. IBM is doing a great deal in training and education besides those courses (Branscomb and Gilmore, 1975). Technicians are offered a 48 week training program, 40 hours per week, on research into integrated solid state electronics. These courses include math from remedial through calculus, chemistry with lab experience, electronics, and integrated circuits. Other inhouse training includes sales, programming, customer training, and various types of system engineering.

Olin Kraft, Inc., has three adult education courses. For employees, the company provides reading, math, science, and language courses which should allow the employee to pass the GED test. Classes meet twice per week, for three hours each session, on the employee's own time. For applicants, the company has two programs, one for high school graduates who cannot meet employment standards and are offered remedial work, and another for applicants with little formal education to allow them to meet employment standards.

At the McCook plant of Reynolds Metals, basic skills are taught in 30-day, 60 hour courses. The company uses its own plant-related materials to teach the basics, showing the connection between these skills and job proficiency (BNA, Policy and Practice Series, No. 215).

An award winning program in reading, listening, and memory improvement at Florida Power and Light provided employees and their families with personal skills through speed reading and listening, and used materials to enhance employee knowledge of company and community issues (What's Ahead in Personnel, 1/16/80).

Obtaining college credit for course work is fairly common. The issues behind it are: the coursework be related to the job; and where the course is taught. The colleges of Xerox and General Motors have courses approved in the National Guide to Credit Recommendations for Noncollegiate Courses (ACE). The total corporate figure of courses thus approved is over 1100. A vigorous evaluative procedure ensures quality, with the review including formal instruction of at least 30 contact hours, assessment of student performance, qualifications of instructors, and teaching objectives and materials. Some programs in this category are: ATLAS, of C & P Telephone; Middle Management Effectiveness at Southern California Edison; Elements of Supervision at John Hancock; and data processing at Digital Equipment Corp.. A part of this credit system is the remission of tuition. There are several styles of this, such as

Kimberly-Clark's, but problems develop over job or career-relatedness, payment when the employee receives a degree and leaves, or payments for remedial education. It should be noted that this type of coursework is especially for management, or those with a good education already (Lusterman, 1975).

Some of the programs given above are constructed for training, that is, for specific job skills. However, it is becoming evident that some employees need basic education, or remedial math and reading and certain mental skills, before training may begin. If an employee cannot read the calibrations on a dial, for instance, he cannot be expected to learn the entire job process. Several programs to upgrade employees have been found, especially those reported by E. F. Shelly and Company (1971), and Wenig and Wolansky (1972). Chrysler, in an early version of the programs it eventually marketed under Chrysler Learning, taught motivation, discipline, and teamwork, along with giving counseling help. Training itself was conducted in a vestibule school, using the same equipment as the plant but without the problems of error and waste, and interference with the operation of the plant. Another factor was continued support for the employee once hired.

Cincinnati Milacron, responding to new products offered, has a Personnel Development Center to coordinate training and assessment. Working on a theory of individualized instruction, the company offers courses from basic skills to advanced chemistry, and makes provision for degrees in engineering. Using a systematic counseling and referral system, employees may choose courses from the company or outside resources to expand their career options. There is tuition aid for courses, which expands the pool of employees able to tackle new technical skills.

Georgia Kraft, in an effort to promote more minority workers into higher level jobs, found that many employees were illiterate. Using a U.S. R and D program, the company offered instruction in basic skills, in a voluntary, off hours, program. The results showed that the program did work, but some hesitancy was noted in minority employees applying for previously all-white positions.

Hughes Tool Company, faced with a similar problem of promoting minority workers who were illiterate, created a 10-week course in remedial basic skills. The course is intensive lecture, individualized, and is handled by the department in which the job is located. Help is given in acquiring the skills needed to pass the various tests for promotion to higher levels.

New York Life Insurance has a formal structure of promotion, and has a high minority population in clerical positions. To allow greater movement within the structure and thus to reduce a very high turnover rate, the company offers courses in secretarial skills, which are offered on company time. Outside resources are also used, such as MIND Inc., for supervisory personnel in human relations areas. New York Life also provides for GED tutoring, although the survey reported that this aspect is not functioning well.

Among various industries, some generalizations may be made about types of training (Wenig and Wolansky, 1972). In the motor vehicles trade, training is informal on-the-job, conducted by supervisory personnel on company time. Some classroom work is added to OJT in apprentice training. The Basic Steel industry is similar, with after hours skills upgrading given in classroom training. The same is true, with little variation, for the other industries cited, tires, apparel, printing, air transportation, telephone, department stores, banks, insurance offices, and hotels. On-the-job training by supervisors is common, with remedial or specialized work provided when necessary.

This rapid summary cannot hope to do justice to the myriad of programs sponsored by industry. It has tried to indicate the variety of features which are offered, and the level on which types of training are conducted, from basic skills to college degrees. Despite the exemplary programs given, however, it must be stressed that the great majority of private sector employees have no access to formal training, and many in companies where training does take place are denied the opportunity. Myers (1971) sums up this position,

> "The usual process of training and manpower development for production jobs in private firms involves informal on-the-job training and upgrading more often than formal in-company training programs."

Myers continues this approach, citing the presence of entry level requirements or employment tests, and rules governing progression. Such requirements block access for those who are illiterate or otherwise deficient in even basic skills. Typical on-the-job training is informal, with the employee shadowing an experienced worker. Some more formal training is possible, such as vestibule schools where the equipment is real and errors are not a detriment. When new techniques or equipment are installed, employees may learn proper procedures by using them, rather than be taken off line for instruction. Whatever the case, as Lusterman (1975), says, " at least some, and often all, of this new knowledge and skill is acquired in the course of working. The process may be haphazard and unplanned, as learning by observation and imitation, or by trial and error." When instruction is given, it usually consists of step-by-step procedures, which does little for employee potential development.

Off-the-job training, where it exists, is more flexible and more tied in with conceptions of enrichment and self-development, besides supplying the company with employees skilled in technical areas. In job aspects where errors are costly, simulation, case studies, or role playing are used to imbue proper thought or methods without risk. With changing needs of the company or individual, and with change in philosophy about the employee, companies may offer wider varieties of training and education, and even extend offerings to employees' families. Companies offer courses, mostly on company time, using inhouse or outside resources, usually in an individualized or modular format to preclude wasted class time or boredom. Also sponsored are courses taken at schools or colleges where tuition is refunded. These apply mostly to management or professional fields where increased knowledge in technical areas is necessary. Other courses may be offered as required, often involving basic skills work.

No concluding remarks can be made because of the variety. Corporations are an integral part of the educational system of this country, and should be given credence for their abilities in training. While the schools and industries have differing philosophies, there can be common ground where techniques may be interchanged. For industry, training or education must be practical, must fulfill a need, and must bring results in as short a time as possible. There are places where the schools could benefit from such a theory, especially considering those students for whom schooling is anathema.

Problems in Training

The previously cited literature and the comments relating to it have shown that there are many decisions to be made when training is considered or practiced. It may be beneficial, then, to review some of these problems, not from a standpoint of offering solutions, but from a desire to indicate the questions one asks when training is discussed. The list given is by no means complete, but it should serve to give clues as to the role and functioning of training programs.

Problems to be considered are:

1. the providing of training;
2. definitions in training;
3. training vs. education;
4. needs assessment and job analysis;
5. instruction in training;
6. two programs in instruction;
7. cost-benefit in training;
8. motivation for training and entry level training;
9. facilities for training; and
10. organization of training.

Each of these will be noted, with references to relevant literature.

1. Providing of Training.

Decisions about training, whether to provide it and what form it should take, are influenced by all of the points listed to varying degrees. In this particular item, however, it is beneficial to examine training activities by company size and function. The distinctions made show that employees may or may not have opportuities simply depending upon the employer. Material for this point is taken from the Conference Board survey as reported by Lusterman (1975).

Company size heavily influences the presence of training programs. The largest (over 10,000 employees) report almost unanimous endorsement of tuition aid programs and on hours inhouse courses. For the smallest (500-999 employees), the percentages are 82% and 71%, high but not as prevalent. There is also a decline in the percentage of the work force who do, or can, participate, 14% for the largest, 10% for the smallest. Lusterman says,

> "Economies of scale often make it feasible for larger companies to engage in education and training activities that smaller ones cannot afford -- The smaller firms...(tend) to rely more on the employment of persons already trained, or on on-the-job training."

Other evidence for this is apparent in the programs offered especially in remedial education (cf. Furlong, 1965).

Lusterman also concludes from the survey,

> "Since larger firms often have greater numbers of facilities and units and employ a greater variety of specialists, education and training activities are more apt to be found somewhere within such organizations."

In terms of company function, there are clear differences in the scope of training activities. Financial institutions provide the most, and the transportation - communications - utilities companies are a close second. Wholesale or retail and manufacturing companies are lower. Size is not well correlated to these types, since small financial businesses still have a high incidence of training. A higher percentage of employees in financial institutions take classes than in any other category.

After hours programs are provided by over half of the largest companies, and by one-fourth of the smallest. Again, financial institutions provide the most. For during hours programs, the largest again provide courses, while about two-thirds of the smaller do. The types of programs are managerial or technical, with only 8% of all companies reporting remedial education. Lusterman concludes.

> "Approximately nine out of ten of the largest companies provide courses in managerial subjects and a like number in functional ones; fewer than half of the smallest companies provide courses in either of these areas."

Financial and utilities companies provide the most managerial and functional courses.

These data point out the extent of programs in large companies, and the lesser amount in small ones. For those employees who have other career aspirations, or who need special training to reach entry level status, smaller companies may not be able to provide needed activities. Depending upon local distribution of companies, this may represent a serious problem for the mobility of local workers, and a heavier reliance on the schools for provision of basic academic and technical skills.

2. Definitions in Training.

As cited in previous sections, there is some confusion about the differences between training and education. This is a good example of the diversity of opinions on various matters relating to training activities. For this problem, the results of a survey by

Somers (1971) is helpful, since he cites problems in definitions as recorded by respondents. The survey was a trial, to determine if a mail survey was possible in examining the extent of training programs.

On-the-job training was questioned, since some employers differentiate between it and learning by doing. The original criteria of paid instructors, lost time of instructors and trainees, or lost pay of trainees were not suitable. A similar problem is the use of a vestibule school, where it is on-the-job since work is done, and off-the-job because it is in a special place. It seems that the term is too general to be useful.

The most common training arrangement is supervisor as instructor. For this reason, it needs to be detailed as to function of the supervisor in training, the place of the supervisor in the organization of training, the role of the supervisor in selection of trainees or in assessing training needs, and other topics. The widespread use of this term and its widespread practice, make supervisor as trainer difficult to define.

Orientation to the job is common, and so diffuse depending upon the type of company that it seemingly defies a discrete definition. Of concern is the boundary between orientation and on-the-job training.

Tuition remission is also common, but includes such practices as a five-dollar fee for a company course (to be returned when materials are returned) (cf. BNA, Policy and Practice Series No.235), to advanced technical coursework taken by scientists or engineers in a graduate school (cf. IBM, Branscomb and Gilmore, 1975). Needed would be a distinction made by course, by structure such as in-house or outside, by subject such as remedial English or Advanced Calculus, and/or by participant such as management, clerical, technical, or production staff.

Cost-benefit is difficult to calculate (see below), and dependent upon the company philosophy of training and education, the type of training, the motivation of the employee, or the role of the training officers.

Federal compliances or tax credits are continually changing, and companies are not always aware of all the current regulations. Much needs to be done in information dissemination before these aspects can be studied.

Somers concludes,

> "Almost all of the interviewers in the pilot study have concluded that a national mail questionnaire survey of the type planned is not feasible; quantitative analysis of the questionnaire data confirms their view. The reasons for this conclusion emerge from the findings with regard to extent of training, problems of data availability, and conceptual and definitional questions.... Problems of definition...went beyond faulty wording of the specific pilot questionnaire. Many of these problems were fundamental and would confront any questionnaire designed to gather data on training in industry."

The Lusterman (1975) report does not mention this problem, only that response to the Conference Board survey was c.22%. If there are questions about the study of training in industry, these two surveys point out the most severe, conceptual and return rates.

Local area surveys would appear to be more valid, since the researcher can construct definitions based on local opinions and vary definitions depending upon local company types. Return rates can also be elevated by better contact.

3. Training vs. Education.

This distinction has been presented earlier. The typical definition revolves around skill training and general or specific knowledge education. The problem is apparent in a number of ways, including the philosophy of the company about its employees and the way employees should be treated. A prime economic motive is bettered employee attitude toward a company which sees to the employee's personal knowledge needs, and thus a reduction in the turnover rate for both labor and management, and those with special skills.

A cause of the distinction is an underlaying conception of the role of industry and of the schools in preparation of workers. Gustaitis (1967), quoting Charles Adams of the National Association of Manufacturers, says,

> "Industry is a hell of a problem solver.... But we're conditioned to assume that the public schools will turn out what we need by way of manpower. By and large, industry has not felt basic training to be its domain."

Gustaitis continues,

> "Most of industry's education efforts are limited to inservice training and courses designed to broaden the knowledge of employees who are university graduates, filling them in on the many recent advances in technological and other fields."

In more recent years, this idea has expanded, in some companies (cf. Rosow, 1980), to include the entire work force. Without belaboring the issue, it is imperative that industry and education coordinate their efforts, and fully understand what each is doing, and where each can benefit the other. Putting philosophy aside, there are common goals and needs for the schools, industry, and labor force. Competition in this area is counterproductive, while a blending of the theories behind each may evolve new conceptions in what workers need and in methods to provide for those needs.

4. Needs Assessment and Job Analysis.

Ascertaining the needs of a company or an individual is dependent upon what one is looking at, and where one wants to go. For a company, needs may arise from new procedures, new employees, or new industries, or may arise from the hope of later benefit, such as a stable labor force (Lusterman, 1975). Assessment for individuals is more complex, since it involves motivation, attitudes, aspirations, or possibly deficiencies. There may also be needs based on one's particular job and the skills which an individual has or does not have needed to do the job.

If assessment is to be effective, that is, if it is to identify specific problems which need intervention, or specific goals which should be attained, then it must be based on the practical, individual, and formal state of current practice. For example, Shelly (1971) and Company found in their survey of skill upgrading in Cleveland (SUIC) a service called Advanced High Intensity Training, which includes redefinition of jobs, individual counseling, and supervisor training. The important points to remember here are that the set of needs derived from practice and those derived from goals must be joined. Assessment without considering the consequences of intervention will be useless, for one may determine a need which has no bearing on successful job performance.

The levels of needs assessment need to be systematized. Corporate management, line supervisors, and employees may identify components of training programs, but there must be one central authority to assess the assessments. Job performance needs may indicate some training, but job rotation may satisfy some of these. Corporate goals dictate needs as directions, and this direction should be compared to employee aspirations and plant procedures.

However assessment is carried out, needs must be identified as current, rather than as historical or traditional. The necessary, rather than the faddish, should be incorporated into training, and the no longer necessary removed. Systems of assessment procedures, in which those responsible are thoroughly trained, will help cut costs by eliminating what is unnecessary, pointing out genuine needs which relate to the employee and the future, and guiding programs to satisfy individual requirements.

5. Instruction and Instructional Strategies; and
6. Two Programs in Instruction.

Closely allied to needs assessment is instruction, where one tries to teach what is needed. The most frequently cited strategy is behavior modification. Willard (1973), commenting on Citibank, calls for, "behaviorally oriented training", and, from the perspective of a training department, gives the following directives:

> 1. "We respond to operational problems, as stated by line management, with analysis, to see if there are problems to which our behavior change skills might be directed.
> 2. We ask that problems be stated in operational and quantitative terms ... .
> 3. We build training programs, on request, that are designed to produce behavior change, and we require that each program produce the requested behavior in a pilot test under operational conditions before it is delivered to the customer."

Gardner (1976), in his lengthy analysis of job training instruction, says,

> "Our training should have the objective of enabling the employee to perform at the level required to meet job standards; and the "terminal behavior" indicating that the learning has occurred should be the actual performance of the employee at this level."

The emphasis on training here is clear; the employee must be able to do the job. Again, however, the instruction hinges on the analysis of what is needed. In this type of training, that analysis is based on the job tasks and requirements. Humanic Designs (n.d.) provides such analysis procedures. They say, in brief:

1. Define the job.
2. Identify the separate tasks or elements within the job.
3. Describe the tasks, in terms of equipment, worker duties, time, performance criteria, and output.
4. Determine the knowledge, skills, and/or attitudes needed to do the job properly.

In such a framework of analysis, instruction will be centered on developing objectives based upon each task, the sequence of tasks, the content, and the strategy to present the material. The behavior orientation of this approach necessitates a behavior change type of instruction. It should be noted that this is training, with only marginal education.

One other example shows this link between the analysis of a job and instruction. Moe (1979) surveyed literacy requirements of several occupations, using the Dale-Chall and Fry Readability scales for work related literature, recordings of work related speech, and samples of materials with mathematical content. This is also training in the sense that the emphasis is placed upon what the employee needs to know in order to do the job. Instruction is then contingent upon building reading or math skills to the level found from the analysis.

There is some debate on this technique. Jacob and Crandall (1979) review literacy requirements, and question the use of readability scales. They also pose concerns about the relationship between job status and literacy needs, and the development of literacy while on the job.

In a more specific sense, Rowan and Northrup (1972), in a survey of paper industry employees of minority ethnic groups, found that even trying to teach basic skills is thwarted by using programmed materials, since these tend to ignore different cultural affiliations. It is apparent, then, that a mechanical assessment of need and behavioral change instruction technique is viable for some employees, but there are factors which may eliminate potential gains if they are ignored.

Two such programmed packages are cited by Gustaitis (1967). These are among the first to be constructed for a company and then be marketed. MIND, Inc., Methods of Intellectual Development, begun in 1963, uses programmed instruction with tapes of lessons and workbooks. As such, the program is self-paced, with frequent checks of progress and provision for repeating lessons. A monitor is present for help, but there is no teacher *per se*. Gustaitis gives an example in math, where students hear a problem every ten seconds, and as they progress, the time is shortened gradually to two-second intervals. After seventy-nine hours of work (usually one hour each before and after work), the students may record an increase of two to three grade levels in words, spelling, and math. The BFE (Board for Fundamental Education) Systems for Success (1964) uses teachers. Furlong (1968) reports on one example. In reading, it uses the phonic system, ordinary reading materials, and a pairs approach, with an "active" and "passive" learner grouped together. Included in this instruction is recognition, at least, of career aspirations and cultural affiliation. The program can elevate reading ability by over three grade levels in seventy hours.

Instruction which emphasizes only the immediate need of a job, not the "educational" ideas of future need or employee career goals is hardly beneficial either to the company or to the employee. Manipulative skills may be taught, but without any theoretical orientation, such as properties of certain metals for instance, the employee cannot progress, nor can the company promote him. Thus, a continual sequence of on-the-job training is needed to handle a fluctuating work force.

Another strategy which is similar to programmed instruction is computer assisted or managed instruction. In this connection, Branscomb and Gilmore (1975) say,

> "(One) characteristic of industrial training is the reduction of the course material into relatively small modules of instruction. The motives for this structuring of the material is flexibility of presentation as well as measurability of effectiveness."

Citing the time needed to create one week of training on a technical subject, about 50 weeks, Branscomb and Gilmore (1975) say that the ratio may be as low as 20 to 1. IBM, Bell, and Xerox, among others, are using computers, since they provide for flexible use, elimination of an instructor, immediate use of material, and systematized instruction. Programs may be easily distributed to other company training centers, and may be easily modified when necessary. CAI can also be used for more "educational" instruction.

Cost is a primary consideration in the installation of a computer network, but a more serious problem is the use which employees can make of it, and similar programmed types of material. The cultural and attitudinal problems mentioned above are applicable here. Programmed instruction requires self-discipline, a quality which employees may lack. The use of a television screen, for instance, may evoke responses other than as a learning device. Care is then needed before such programs are introduced. The BFE Systems for

Success program is, in part, based on this problem, since it uses teachers and a classroom setting. Such training programs as Chrysler Learning (see Examples of Programs) point out the need for other types of instruction, in punctuality, attentiveness, and proper job attitudes. Job skill training alone may not be sufficient for optimum job proficiency. And, a fair amount of training may be needed in order to operate the programmed instruction, especially if it is computerized.

Lusterman (1975) summarizes corporate views on training:

1. Because of employee motivation to learn, especially in salary and promotion, programmed and self-instruction materials are common.
2. The factory is an ideal setting for learning-by-doing, and the place where theoretical knowledge is immediately translated into practical skill.
3. It is practical, and, to avoid lost time, concentrates on rapid learning, often in module form, so an employee learns only what is necessary.
4. It is individual with much student input, and thus materials and strategies are adapted to an individual's requirements.
5. There is some emphasis on cooperative, teamwork activities, rather than the competition of schools.
6. Modular instruction permits quick change in curricula, much more rapid than a school's curriculum may change.

These points are most valid for employees with some skills already. As noted, however, those who are illiterate or lacking in basic skills need other types of instruction, including topics in adjusting to the self-discipline of work.

The orientation of this section is training on-the-job, for the simple reason that outside course work is like other high school or college courses. Since most training is on-the-job (Myers, 1971; Lusterman, 1975), and since this is the primary arena where industry and education may be joined, the importance of this aspect of training is paramount.

7. Cost-benefit in Training.

The cost of training in relation to the benefits the company receives from it are difficult to assess. The advent of federal mandates on training for the unemployed, however, has helped detail some of this ratio, but the results are still far from clear. Sporadic evidence only is recorded. Wenig and Wolansky (1972) quote the USDOL,

> "The lack of comprehensive data on employer expenditures of training is one of the most significant gaps in information on training in industry."

They also show the need for more such research, concluding as one recommendation, "on cost benefits of providing semi-skilled and skilled job training through private industry versus vocational and technical education."

On-the-job training is, by far, the cheapest method, averaging about $500 per year. Comparative costs for vocational education are $2,000 to $3,000, and $3,600 to $4,400 from MDTA. Of course, vocational education implies more than specific on-the-job training, so comparisons are somewhat misleading.

The derivation of cost benefit involves many factors. Willard (1973) says of Citicorp, "The only justification for training is that it must contribute more to corporate earnings than it costs to conduct." He cites seven areas where training impact should be analyzed,

1. "increased productivity or added operational capacity,"
2. "reduced errors and waste, including unnecessary training,"
3. "reduced operating costs,"
4. "increased profits through sales of new services,"
5. a management trained in "manpower development in terms of corporate needs and within cost considerations that promise reasonable return on investment,"
6. the development of trainers who can provide cost-effective training, and
7. improvement of the training and trainer image, meaning that the operation is business-like.

Willard does not say how to analyze programs in these terms, but one can still see the connection between these ideas and those of the whys of training.

Lusterman (1975), focusing especially on off-the-job training, lists the following costs:

1. wages paid to employees before they are job proficient,
2. time of trainers,
3. equipment use,
4. error or waste.

Part of the cost is an investment, whereby an employee trained in a job will produce at a profitable rate. However, the employee may leave, and the investment in training is lost. There is also the problem of the employee who cannot perform at an optimum level after training and must be trained again. And, some employees need training in working before skill training may begin. Citing Pyle, Lusterman says that corporations may suffer from treating training costs as expenses rather than as capital. An employee is not a machine, which may yield to annual measurement. How does one evaluate replacement cost, or the use of one person over another on a job? In training, employees have the immediate advantage of improving their state while earning a salary. Employers have the benefit of a skilled worker. If the employee is trained and leaves for another job, there is the benefit to the former employer of wages not paid during training.

Larger companies have the largest share of corporate inhouse training, considering that they have the money to spend on training departments. Smaller companies tend to use more outside programs. MIND, Inc., for instance, costs $250 per person ($450 if MIND does the administration). The largest companies average about $80 per employee in training, while the smallest (500-999) spend about $30. The mean is about $60. The proportion of inhouse to outside courses is similar, with the largest spending less for outside (13%) and more for inhouse (87%), while the smallest spend 53% outside and 47% inhouse. The total amount spent on training in 1974 is estimated at $ 2 billion, spent on about 13% of the work force (Lusterman, 1975).

Cost benefit is difficult to assess because of employee proficiency, the effect of training and of education in the long term, the theory behind the analysis of costs in training, and the benefit in terms of lowered welfare or public support rolls. The problem is similar to that in education, where there has been a traditional battle between those who desire measurable quantities to judge effectiveness, and those who believe that an improved intellect is not amenable to such measurement.

8. Motivation for Training and Entry Level Training.

Mention has already been made of this problem. Motivation includes that of the company and of the employee. The factors which influence a company's decision to provide training are generally those found in the goals of training, profit, competitive standards, labor force stability, and productivity. However, the requisite skill level of jobs produces problems of their own. High skill jobs, associated with those which necessitate advanced academic study, are provided outside the company. Low skill jobs, however, are the domain of inplant training. The bridge between the two is difficult to cross, considering that one would be going from training to education. The traditional nature of on-the-job training, specific skills for specific jobs, necessitates continual retraining when employees change jobs (Wenig and Wolansky, 1972). The efficiency of more flexibility in training is obvious, but cost factors, philosophies, and needs may dictate a more immediate orientation to training.

One major recent factor in motivating a company to conduct training is federal mandates on employment of previously unemployable workers. For instance, Shelly (1971) reports on the Georgia Kraft Comppany. There were a number of black employees who could not enter the job progression because of illiteracy. This denied them also any on-the-job training which was done. With the Civil Rights Act, however, the company was forced to provide training to allow these workers access to higher jobs. The provision was for remedial education in basic skills.

A similar situation occurred at Hughes Tool Company. Minority workers were unable to pass the tests required for promotion to higher labor grades, and so a tutorial system was developed for skills in shop math and blue print reading. There is also skill and craft instruction given on-the-job.

As we have seen, however, simple job instruction or even remedial programs are not the only requisites. Companies may need to acclimatize workers in job attitudes, such as punctuality, responsibility, and diligence (cf. Chrysler Learning). This area may be the single largest detriment to entry level hiring of the unemployed (Wenig and Wolansky, 1972). Myers (1971) points out that for the disadvantaged, there must be carefully controlled instruction and training; entry must be gradual, and the new employees must have continual emotional support.

Companies, then, are prompted to train by their own needs, or are prompted to offer such enticements as tuition aid especially for high skill employees. They may also be required to train by such mandates as the Civil Rights Act, or be given incentives through MDTA or CETA.

On-the-job training is most often conducted by supervisors. When training is begun, then, the trainers may need some support. At Cincinnati Milacron (Shelly, 1971), supervisors are encouraged to interview employees periodically for their personal career goals.

Supervisors then recommend employees to the company Personnel Development Center for training. The supervisors, then, would need some instruction in this type of assessment. Precision Castparts Corporation, for instance, was troubled by absenteeism and low productivity. In this case, the entire management corps and the employees began holding meetings to air complaints and refine the job progression. Outside professional help in management and pyschology aided the process.

Employee motivation for training is largely for promotion, and to some extent for future goals. This is clearly a place where problems occur, especially when communication is poor. The Shelly survey (1971) concludes that workers often do not articulate upgrading requests, and that any such work must not involve too much of the worker's time and money. Thus, on the job, or time off from the job, is the most productive time, and tuition aid or retention of wages while in training are indicated. Grinker (1970) shows that, if upgrading is not available, both management and labor are apathetic about improvement. Employees, especially minorities, may also be reticent about upgrading if it involves previously all white areas (Shelly, 1971).

An example of motivation for employment through reliance on the employee's concerns for the future is given by McCarthy (1970). In Detroit, dropouts or potential dropouts, after screening for goals which relate to training or future employment, enter an ESEA program where the employee's goals are met as closely as possible in an individualized program. Included is both classroom and work experience.

Another use of outside resources is Flanner House in Indianapolis (ED 057 165, 1968). Funded by the federal and state government, and private industry, the program is run by neighborhood agencies and trains the unemployed for jobs. Remedial education is a key ingredient.

Motivation for employees may be personal goals or promotion, but for the unemployed, intensive, neighborhood based programs appear very beneficial for entry level training. While private industry may be interested in such endeavors, and may offer funds, it is not yet in a position to do what community programs can. In light of the reports on the support which these workers need (cf. Myers, 1971), such home-grown remedies with outside funding sources are apparently successful.

It is clear that motivation for training encompasses all of the role groups involved. Communication between these groups is essential, as is, usually, outside funding to begin pilot projects. Private industry, then, while beginning to work on these ideas, may give immediate support to efforts which overcome prior deficiencies and provide the wherewithal for career advancement.

9. Facilities for Training.

A problem for smaller companies especially is the material and space needed for training. As Myers (1971) has shown, most training occurs on the production line itself. The primary problems with this approach are the potential for error, slow-down of the production process, and lack of appropriate opportunities for employee adjustment to the work place. The most beneficial blend of instructional types appears to be a combination of on-the-job training and classroom work (Somers, 1972).

The use of classrooms is vital to the transfer of all but specific job information. There, instruction can be tailored to the content; the workers are away from the work area; and the atmosphere may be controlled to permit freer flow of ideas. For instance, Wenig and Wolansky (1972), citing Murphy, says about one company,

> "Classes are held in an unused meeting room in a power station. This is off-the-beaten path, quiet, and with ample facilities and accommodations. Tables and chairs set at angles help create an atmosphere of informality and encourage participation. Visual aids, such as blackboards, charts, movie projectors, and tape recorders are employed by the instructor."

As Wenig and Wolansky (1972) concluded, the physical setting of training is a prime ingredient in its success.

Vestibule schools are examples of such environments. They combine practice on machinery and classroom discussion without hindrance to the production process. One major problem is cost for such schools, and the need to keep the machinery in the school the same as that in actual plant use. Gardner (1976), whose instructional guidelines make heavy use of this approach says,

> "In a vestibule training facility, there are few practical problems to complicate the establishment of a desirable practice schedule. No production demands are placed on the vestibule equipment or machinery, and repetition of specific job tasks or subtasks can be arranged for any length of time without regard to the full job routine or perhaps even to the processing cycle of the machine. Within the mechanical limitations imposed by the machine itself (in regard to the stages at which we can stop it and back track for purpose of the operator's tasks), we have the freedom to give the trainee

> practice in those units of the job and for those periods of time which make the most sense from a learning viewpoint."

Gardner also cites benefits in terms of long-term production rate, at the expence of short-term employee training.

The cost involved in creating a vestibule school may be overcome by its benefit to the employee's production and attitudes. Myers (1971) has shown the need for gradual entry into full-time work among some employees.

Space is needed for such schools or for other types of programs. Somers (1971) gives some examples. Cincinnati Milacron has a separate Personnel Development Center which trains in its own facilities; Georgia Kraft uses a special inplant room for its programmed instruction, with the room open twelve hours per day; and New York Life trains clerical and secretarial help in a special room which has desks, files, and typewriters like those in general use.

If a company uses a specific program of instruction, there are usually space requirements to be met. Humanic Designs' Handbook for Upgrading (n.d.) implies the need for a classroom and instructional aids. The MIND system (cf. Gustaitis, 1967) requires desks and learning stations, along with tape recorders, to enable employees to use the programmed instruction. The Board of Fundamental Education's program is classroom oriented (cf. Gustaitis, 1967; Furlong, 1968), with the necessary supplies such as a black board and desks. The choice is dependent upon the employer's conception of flexibility in learning and upon the dynamics of a classroom or self-development approach.

Other facilities may be used, especially for the education aspect of instruction. Smaller companies use outside resources (Lusterman, 1975) and thus often use the facilities of schools or colleges. Some large companies, as we have seen, have their own colleges (cf. *U.S. News and World Report*, 87.3, July 16, 1979; Luxenberg, 1980), but this is beyond the scope of most industries.

Facilities may usually be found in spare rooms or outside of plants. For instance, outside projects in upgrading may defray costs of training and/or provide space. The Syracuse Upgrading Project (Somers, 1971) set up a store-front skills center in the city, for companies who had no space or money for equipment. As in vestibule schools, equipment needs may be expensive especially if they involve the use of machinery. It must be remembered, however, that the investment made in facilities or supplies may be lowered or eliminated through better employee attitudes, reduced error, and higher production skill. The long term benefits of such training should outweigh the initial financing.

10. Organization for Training.

When training is offered, there are potential difficulties in the organization of the training function, *i.e.*, who does it; who makes which decisions; who creates materials; and how facets of training may be combined. Lusterman (1975) provides a useful guide to this discussion. As with much else, larger companies have more staff in training than small companies do. 95% of the large have such full-time staff, while 16% of the smaller do. Overall, 42% of companies have someone in this field. The same ratio holds for companies who have their own teachers (51% for large, 10% for small). While such training departments have been "burial grounds" for older employees, recognition of the importance of training has prompted distinct upgrading in departments, including the use of those with an educational background.

As with other aspects of training, industries present a wide variety of organizational styles. There are Central Departments which conduct all inplant instruction or provide information on outside opportunities (cf. Cincinnati Milacron (Shelly, 1971)). There may also be separate training units in each of a company's divisions or plants. An interesting example of the change from this fragmented approach to a centralized system is given by Willard (1973). At Citibank, training was held in each branch, provided by local employees, outside consultants, or management. To organize the inhouse activities, the new training group either ignored the present trainers, absorbed them into the new group, neutralized them into extinction, or bolstered their efforts. For outside consultants, the group set standards of performance and criteria for providing instruction, including payment only if there were measurable results. Through this, the group become the single authority for corporate-wide instruction.

Whatever the system used, the organization of training comes down eventually to an instructor and students in a class (or wherever). The principle problems are the quality of the instructors and the content of instruction. Instructors may be anyone from inhouse supervisors to top management, or outside consultants and teachers. Most often, supervisors carry the burden of needs assessment, employee selection for training, and instruction. Several examples show the problems in this approach. Project Apple Core (ED 118 864) used employers, project staff, and supervisors to identify job competency requirements, employee competencies and interests, and needed instructional materials to produce an individualized package for employees. From the Shelly (1971) survey, we have the stories of:

1. Cincinnati Milacron, which uses foremen and supervisors to assess the career goals of employees through interviews;
2. Georgia Kraft, which uses outside consultants for their programmed basic skills instruction;
3. The Hotel Trades Council, which uses consultants to assess industry and worker needs and to plan for programs;
4. Hughes Tool Company, which uses supervisors for job training and a training department for crafts and special skills;
5. The International Union of Electrical, Radio, and Machine Workers (IUE), which trains its own staff to work with companies on planning programs, and trains counselors to acquaint employees with opportunities;
6. The LEAP project of DOL in New Jersey, which selects employees and trains them as counselors in occupational skills and counseling techniques, after which they survey employee needs and available outside resources and try to coordinate the two;
7. New York Life, which uses supervisors to select employees for participation in the training department's programs, conducted by their own instructors;
8. Precision Castparts, which, in response to numerous employee complaints, uses psychologists and other consultants to enact a program of meetings to air complaints, where management and labor could begin communicating their respective views to each other;

9. Texas Instruments, which posts job openings in a company paper, where employees may apply and receive free training; and
10. AT & T (Luxenberg, 1980), where supervisors train in job skills and attend classes in personnel management.

These examples give the range of duties which supervisors may have placed on them. It is clear that some system is needed for two-way communication of needs, and that training is needed for those who will select or screen, and instruct employees.

A typical example of instruction by corporate trainers who have other duties (a common occurrence), is given by Dean (PDK, 61.5, 1980). At IBM, instructors who are already employees learn techniques by observing experienced instructors, and are given courses in classroom management, curriculum development, and instructional strategies. These instructors work through a manager of an adult education center, who determines what courses are needed in each of several company curricular areas.

McQuigg (PDK, 61.5, 1980) summarizes the typical arrangement of training,

> "The primary role of education staffs is program development and administration. Actual teaching is done by line management. It is also the line management — especially the department head—who has the most to say about who is to be exposed to formal training and development activities and to what extent. Line management generally defines training and development needs."

However a company organizes its training, there are clear instances where more training is needed for those who assess needs or present material. The problem of content has been addressed earlier, but there remains the critical importance of communication of needs to those responsible. Without such a system, as Grinker (1970) shows, apathy about improvement on the part of all employees is evident, to the detriment of production and even company survival.

Concluding Comments

The numerous instances of problems affecting training should point out, in essence, the critical role of planning when training is being initiated or restructured. All of the ten examples given must be considered when training is constructed. There are other sources of difficulty, but, assuming that this list is representative, we may begin to see a stepwise guide to the construction of a training program and the critical features which must be considered before a program which is responsive to the needs of the company and of the employee may begin. It may be beneficial to review the pattern here shown:

1. A company should determine how it will provide training and whether it can do it or use outside help;
2. It should clearly define what it intends to do, in terms of training or education;
3. It must be able to assess needs, and analyze them for suitability to company goals and worker requirements;
4. It must have a repertoire of instructional strategies to present content in several areas;
5. It should investigate previously developed material for suitability in terms of worker and company needs and worker motivation;
6. It must determine the costs of training, and decide whether training is an expense or an investment in human resources;
7. It should look to enhancing employee work attitudes before skill training may begin, and it must investigate the needs of entry level employees, especially those who are new to the work place;

8. It must note its facilities for training, and the provision of equipment; and
9. It should have an organization which, at the very least, must be able to ascertain needs, and present programs in accordance with company priorities, worker requirements, and personnel development.

Training can no longer afford to be an expression of company history or burial ground for management. The increased professionalism of the field of industrial education requires individuals who can handle the complexities of the training function, while keeping an open mind and ear to employee concerns. However it is done, and we have had a glimpse of the range of activities, training is a key feature in determining whether a company survives or not, whether it is competitive or not, and whether it recognizes the value of its human resources or not. The future of a company, or lack of it, depends greatly on how it handles the interaction of the problems given above.

Processes in Training

The processes used in industry to construct curricula or evaluation designs are given some mention in the literature. We have already cited some of the principles behind a training program, and have reviewed some instructional methods. A modicum of repetition is needed, however, to present what may be an outline of current features of the training process, from the goals of training to evaluation.

Lusterman (1975) identifies three aspects of corporate education as having primary emphasis. The "students" are highly motivated by rewards, prestige, and self-development. Learning and doing are accomplished at the same place, there being no distinction between instruction and practice, or work and learning. And, this training is pragmatic, since it is undertaken to aid placement, productivity, and a more stable labor force. Methods are used which are efficient, and produce results in the swiftest possible time. From these three concepts, instruction is directed. Other features which may be derived from these three goals are the use of active learning styles such as simulations, role playing, or other methods of involved learning; communication of desires in training and its effectiveness; teamwork; and attention to individual differences.

Methods to accomplish these goals include programmed instruction, computer managed/assisted instruction, audiovisual aids, and other group schemes such as simulations and role playing. The use of self-paced methods reinforces the ideal of individual reliance, and is more cost effective than forcing all students to go at the same pace.

The MIND and BFE programs have been mentioned for their differences in the use of machines or teachers, as have computers, which require a substantial initial investment. Lusterman (1975) points out that CAI is more interesting to employees, but the time needed to create programs is quite large. Branscomb and Gilmore (1975) indicate that the ratio of preparation time to student use time may be from 20:1 to 250:1. Advantages include the reduction of material to discrete modules, and the flexibility of time which an employee may devote to learning. However, the content must be stable, since change requires more preparation time and could become counterproductive, at least in costs.

Despite the instructional methods used, there is one overriding feature of training—it is oriented to behavioral change. Assuming a system of needs analysis which correctly identifies correct behaviors needed to do a job competently (which is no easy task), the requisite behaviors may be detailed, and trainees may be continually assessed for their performance in relation to these behaviors. Problems may develop when the tasks are not simple manual skills, or, in other terms, when training is mixed with education. The most succinct discussion of this behavioral approach is given by Gardner (1976), already cited above but worth repeating,

> "(I)f the trainee's output is less than the industrially engineered standard, the trainee is not demonstrating a mastery of the job in a practical sense. Similarly, if he produces too many defective items or too much waste, he is not displaying job competency. It is this operational definition of the outcome of learning that the supervisor must live with. And it is this definition which should guide our training. Our training should have the objective of enabling the employee to perform at the

> level required to meet job standards; and the "terminal behavior" indicating that the learning has occurred should be the actual performance of the employee at this level."

Willard (1973), saying that training must be behaviorally oriented, directs his curriculum development under these guidelines: line management cites needs, learned through analysis, which are susceptible to behavior change learning; needs are stated in operational and quantitative terms; the training group builds programs to produce a change in behavior; the program is piloted to determine effectiveness; and then the program is offered to the customer.

Somers (1972), in a survey of skill training programs, gives some general points: training should combine classroom and on-the-job training, since the combination is more effective than either method alone in producing promotion or salary increase; the amount of prior education/training reduces the need for new training; and that prior skill training facilitates the transfer to new jobs.

Briefly, then, the general points about training are that:

1. It be behaviorally oriented;
2. It be taught with practical use in mind; and
3. Its methods be activity-oriented and/or self-paced.

It should also be cost efficient, and evaluated in terms of demonstrable behavior change.

Using this information, and that from previous citations, it is beneficial to examine the models used in curriculum development in industry. In this case, models refer to a process, expressed usually as a schematic diagram showing the interaction of various forces which should be considered when designing a training course.

Woodington (PDK, 61.5, 1980) uses the Goldstein Model of an Instructional System (figure 1). The model has three phases, assessment, training and development, and evaluation. Under assessment, the processes are assessment of instructional need, and derivation of objectives. In training, there are the selection of training materials and methods and learning principles, and the actual conducting of training. Evaluation includes development of criteria from the objectives, pretesting and monitoring trainees in training, evaluating training, and evaluating the transfer of information. Woodington shows that this model provides a frame of reference for planning and evaluation. It delineates the steps to take in creating a training program, including the objectives and the criteria for success derived from the objectives. The fact that the results of training, i.e., evaluative data, are recycled into the assessment phase shows the perpetual need for changing training based upon corporate needs and employee abilities.

Wenig and Wolansky (1972) review several models in their literature search. Explaining that a systems approach facilitates creation of a training structure which identifies responsibilities, organization, and planning duties, they show that these systems can be analyzed for changes based upon increased theoretical knowledge of curriculum construction. The traditional model is four-step (figure 2), which has these features:

1. Prepare the learner
2. Present the material
3. Learner applies material
4. Learner is tested for understanding.

Ford has elaborated on this design (figure 3), to show how objectives and evaluation are considered. His is not a step-wise approach, but shows that objectives begin the sequence, followed by learner preparation and material presentation (both of which influence the objectives). Following this are application and testing, both of which influence the final stage of evaluation. The addition of objectives and evaluation, like Goldstein's model, help trainers devise appropriate content to meet defined needs, and then to determine if the training met those needs. There is, then, a monitoring function built into the scheme.

Another model of traditional instruction (figure 4) shows the separate steps of training without integration. These are: needs assessment; objective setting; program design; implementation; and evaluation. Without an integrated system, a problem in needs assessment or objectives would not be noticed until the training is over, or needs would be treated generally, and the program become too vague for usefulness. This could be called a hit-or-miss approach, or a scattergun - something may come out right but there is no way to predict it.

Taking these five areas, Miller closed them into an integrated system, to show that continual interaction, or checking each against the other, is the best way to achieve a program responsive to training needs (figure 5). Objectives and evaluation, and needs assessment and program design, are shown as influencing each other. The noting of needs and program design is indicative of the idea that the content of training should be presented in the manner most conducive to it, that is, content and process are interrelated.

Another model which recalls the older four phases approach is Renton's (figure 6). The phases are job analysis, course development, instruction, and evaluation/improvement. The emphasis on job analysis as the explicit source of needs is in keeping with the behavioral concept of detailed listing of acceptable behaviors. Renton also gives priority to the job analysis aspect, noting that it is the source of the objectives which the program seeks to attain. Allied to this model is an eight step process:

1. Identify priorities for training improvement
2. Analyze the job
3. Plan the teaching/training approach
4. Develop the training course
5. Screen/classify employees for training
6. Provide the training
7. Follow up the training
8. Evaluate the training.

Renton further reduces the indecision in program construction by presenting a diagram of the flow of decisions for producing experienced workers (figure 7). Such detail promotes forward thinking, resolution of potential areas of conflict, and provides participants with explicit information on what must be done. It is interesting to note the presence of preparatory or compensatory training, which, as we have seen (Myers, 1971), is often needed depending upon the worker population. A problem can be anticipated in the use of "standards". Myers (1971) and others show that the imposition of standards (while necessary) may be discriminatory, especially if the tests fail to consider employee cultural characteristics (cf. Rowan, 1972; Jacob and Crandall, 1979).

Humanic Designs (n.d.) presents a complete handbook to facilitate upgrading of employees. The procedure is broken down into steps, to aid those in planning training in assembling the needed information and then creating instructional units from it. The processes in summary form are given below:

1. Manpower needs analysis.

   This analysis provides information on the work force in particular aspects of jobs, the volume of output, and characteristics of the production process. Also needed are data on the employees, especially those needing upgrading, and the sequence of job tasks in light of concentrations of underemployed workers. Interview data may help show job elements where output is low or where employee turnover is high.

2. Job tasks and requirements analysis.

   A. Job definition.

      This analysis requires the definition of jobs in the production process.

   B. Task identification.

      The specific units of jobs are listed, such as use of a certain machine or an action.

   C. Task description.

      Each task is described in terms of equipment or materials used, actions of those doing tasks, time to do each task, performance criteria for the task, and output. Several such inventories should be done to eliminate idiosyncratic behaviors.

3. Determine task requirements.

   A. Knowledge

      For each task, the principles or theories behind it should be listed, if the employee needs to know it to enhance performance.

   B. Skills

      For each task, the physical abilities, manipulations, or other information handling should be listed.

Abilities to read blueprints, make scale conversions, compute dial readings, or type effectively are examples. Besides the presence of those skills, their frequencies should also be listed.

4. Curriculum development.

   A. Objectives.

      The information from the analysis above is used to create objectives and content units. For each task, the developer cites requisite knowledge and skills, performance description, and performance criteria. The objective will relate to jobs, and may be further broken down into the components for each job task.

   B. Sequencing of tasks.

      Sequence of presentation of units should follow that of the job. Depending upon the job, however, there may be need to deliver preliminary information, or to restructure presentation from simple to complex, and then recombine the material into the actual sequence used.

   C. Curriculum outline.

      An outline is developed for each task, noting the knowledge, skill, and aptitude requirements, and the content of the unit in proper sequence. Materials needed for instruction are listed, and the most appropriate instructional strategy is given.

   D. Evaluation.

      Evaluation is an ongoing part of the process, but primarily dependent upon employee meeting of the performance criteria set in the objectives.

The Humanic Designs (n.d.) model above is helpful in describing the actual process used. More information is given in figure 8. There, we see that repetition may be necessary, as is reinforcement of correct behavior. Evaluation, although shown as a constant, is not integrated into the flow except in a couple of circumstances. It is necessary that evaluation be given prominence, in terms of its continual effect on the training and force for making needed changes.

A more detailed presentation of the acquisition of job skills is given by Gardner (1976). It is primarily concerned with the teaching of skills, in a behavioral approach, and peripherally detailing needs assessment and other such considerations. The focus is, then, on presenting material so employees will learn and retain it. Some of the procedures he lists are:

1. Separation of jobs into tasks, or tasks into subtasks, should be done with attention to the ordering of tasks, and the sequence of tasks found in jobs. While the sequence should be linear, task complexity may dictate other arrangements, such as presenting part B before A. In practice, however, the tasks should be taught as A, then B plus A, then C plus B plus A, and so on. (cf. Lusterman, (1975), quoting one corporate official, "a good manager, who is interested in stretching and challenging employees, will force them continuously to go further - adding 'b' to 'a', 'c' to 'b', and so on.") Attention should also be given to the transitions between subtasks.

2. Practice must be given in skills, usually massed for short tasks or distributed for complex ones. The use of repetitive practice will cause the skill to become automatic, for which reason vestibule schools are the best arrangement since errors will not harm production. When practicing different tasks, the trainer should ensure that they are as different as possible, to prevent interference, or error resulting from using techniques on one task and transfering them to another where such techniques are inappropriate.

3. Practice itself necessitates that the employee use equipment and procedures which duplicate those on the job. Principles may be given, and used in various situations to show learning (such as the use of levers). There are correct procedures to use, and the trainer must be aware of the inefficiency of idiosyncratic behavior and be prepared to eliminate it.

   Motions used in jobs should be detailed and all employees should do them the same for greater flexibility of workers.

   Trainees need practice in knowledge items, such as the location of tools, technical terms, machine operations, quality and safety standards, location of raw materials, and the time in which a job should be done. Motion requirements require aid in manual manipulations, sequences of motions, and bodily positions. Feedback should be taught so the trainee may note the signals to change from task A to B, and so that he may properly assess the correctness of his work, both during the job and at the output stage. The sense to use to determine success or note reference points to indicate correct functioning is also taught.

4. Explanations are common in training, and the trainer should talk through a task and demonstrate it, showing the "whys" of a particular sequence.
   Trainers need to prepare presentations according to their pace, word usage, repetition, and use of audiovisual methods, to best assure understanding.

5. Demonstration, the "how", should accompany explanations, showing key reference points on the job. Slides or other AV aids may be used to show the complete task and to highlight these key points.

6. Direct coaching is often used to provide immediate feedback or cues on the right or wrong procedures and sequences. The trainee is led through the task, and with repetition is gradually weaned from coaching. The trainer must continually assess what the trainee can already do, and not provide too much coaching, and must watch to see that learning is happening, not just responses, and that the trainee is not developing idiosyncratic methods. The goal is employee self-reliance, and an automatic "feel" that the operation is proceeding properly.

7. Continued improvement is usually possible through the showing of confidence, and success in speeding up work. The trainer may help by showing inefficient movements, giving help in problem areas, and providing more practice in these areas. Trainees need time to learn the methods, and must practice on current equipment.

8. Increased speed in production proceeds from the use of compact motions, use of all senses, and anticipation of the next set of motions. The trainee may prepare himself to act in prescribed ways.

9. The trainee may need to know the organization of tasks on jobs, and the requirements of each. The sequence of tasks should be memorized, as should the priorities to follow if conflicts develop. The trainee should know whether to contact others for help in problems or not, and be able to state the problem clearly. The employee also needs to know the machine's needs in prevention and correction of problems, and routine maintenance.

10. Performance measures show the success of training. The trainee should know his own progress, and his problem areas, while the trainer assesses problems and prescribes solutions. Assessment of performance may be measured by counting of errors, speed according to set criteria, or the ability to act at the proper rate of the job. Measures must be objective, and job related.
    Typical problem areas includes motions, speed, feedback perceptions, simultaneous motions, transitions, organization, conflicts in job objectives, changes in working conditions, or motivation. The trainer must determine if problems are the trainee's fault, or that of the job analysis, incorrect speed criteria, trainee personal problems, or low aptitude. Rewards for correct performance, and reinforcement of proper behaviors must be given.

11. Typical instructional methods are lecture and guided discussion, with models and practice time and role playing to show other perspectives especially in interpersonal skills.

This arrangement is a behavioral approach, but concedes the importance of motivation or attitudinal concerns. The curriculum development shown or implied in the models cited tend to demonstrate further the focus on behaviors of trainees, and the possibly mechanical systems needed to produce curricula to effect these behaviors.

An example of the development of curricula in a particular basic skill, literacy, is given by Sticht (1975) in HumRRO's work with the Armed Forces. Because the military is more and more becoming a career choice, or at least a vehicle to help servicemen gain functional skills for future jobs, the material is centered on a career approach, taking into account the aspirations of trainees. In this sense, then, the approach is a union of specific training and general knowledge, or training and education.

Several theoretical points are given prior to the construction of an ABE literacy program.

1. There are problems with the process of determining how requisite reading levels are chosen (cf. Myers, 1971).

2. Some work appears to be necessary to modify trainee speech patterns, since research has shown that speakers of non-standard English have more difficulty being hired.

3. Distinctions need to be made between the literacy skills needed to learn a job, and those needed to do a job. Learning skills involve comprehension, critical reading, and inferences, while doing skills are reference oriented.

4. Comprehension skills include word meanings, organization of main ideas, discovery of main ideas, inferential reading, and critical reading. Reference skills include the use of visual aids, written directions, use of reference materials, and noting of significant facts. The former skills are usually placed about at an eleventh grade level. The latter are short term skills and are for immediate use.

5. Management must determine appropriate criterion levels of reading ability, which also relates to desired levels of job competency. Levels of ability in reading go hand in hand with levels of proficiency and so there are several levels of reading which are sufficient depending upon the desired proficiency level.

6. Because of the variability of reading levels associated with different proficiency levels, management must carefully define requisite criterion levels. For instance, the HumRRO study found that the average reading level of training materials was on a seventh grade level, while its train-program sought to teach at a fifth grade level.

The methods used by HumRRO to determine requisite literacy levels bear some mention:

1. Job reading materials were assessed for difficulty by the FORCAST method, developed by HumRRO. The formula is: $20 - \frac{\text{number of one syllable words}}{10}$, with a range of 5 to 12+ on a 150 word passage.

2. Job reading task tests were developed to assess the levels of different ability levels.

3. Trainees took the above tests, and were then tested for job proficiency. Correlational evidence was obtained to show needed levels.

4. From trainees' records, estimates were made of their reading level, and this was correlated with scores on job proficiency tests.

5. The correlation of job knowledge test scores and job sample proficiency and reading level was high. But, the correlation of ability with supervisor ratings was low.
6. The criterion level for jobs was determined at the point at which three-quarters of job incumbents equal or exceed the level.

HumRRO gives no specific recommended procedure for assessing reading level, since the purposes of the assessment may require different levels, such as for general training goals, specific curricula applications, or specific job requirements. The job reading task test was preferred, since it uses common job reading materials. The problem with this method is ensuring that the materials selected do contain all relevant information needed for job proficiency. This is done by interviews with incumbents who show materials frequently consulted.

The principles developed by HumRRO to guide its literacy program parallel those in other forms of training.

1. Because of poor experiences in education, trainees often require reading lessons which are job related.
2. The use of job materials allows for increased job proficiency, or direct transfers from learning to doing.
3. The program must be individualized, so trainees may work at their own pace with materials relevant to their jobs.
4. Trainees may be paired with beginners, or act as instructors, to reinforce the knowledge they have gained.
5. The program should be built of modules, in keeping with the individualization of instruction, and with the need for immediate feedback (cf. Gardner, 1976).
6. The graduates should be questioned for the relevance of material to their jobs, and for the usefulness of the program in general.

The flow chart for the HumRRO reading program is given in figure 9. It should be noted that the description given here very briefly summarizes all of the considerations and processes used to develop the program. In other training situations, the model may be simplified to eliminate the needed Armed Forces tests, but the principles behind the program appear to be those of other training ventures.

The HumRRO material continues beyond this application to study a career oriented literacy program. The primary findings of the research are:

1. The functionally illiterate need long-term training and education, not short courses, to alleviate the problems of a lifetime.
2. Skills should be oriented to career goals, not to the passing of credentialing tests, whose criteria may be irrelevant or unmeasurable.
3. There is evidence that the functionally illiterate are denied access to even training programs (cf. Myers, 1971). Problems are also encountered in other skill areas, as well as in attitudes. The separation of learning skills from doing skills in terms of reading ability needs to be clarified.
4. The transportability of programs from the site of origin to another site is highly doubted. Programs are either commercially prepared, or one designed for specific jobs in specific locations. The efficiency of programs (c. one grade level per ninety instructional hours) is also questionable.
5. Programs which do not focus on speakers of non-standard English and their individual needs are not likely to aid in employability.
6. Research needs to be done on the literacy demands of jobs, in order to eliminate irrelevant demands and to facilitate curriculum development.

Figure 10 shows the HumRRO design for a career-oriented literacy training program. It should be clear that, if the references to reading are changed to job task skills, then we have a model similar to those shown above. In other words, after much discussion, the model presented in various forms is basically one of needs assessment, setting of objectives, program development, and evaluation. The model in figure 10 does include a pre-training component, similar to those of Chrysler Learning or others who try to prepare employees for work and training.

One further example of literacy training, and a response to HumRRO's suggestion for research, is given by Moe (1979) on the literacy requirements of various occupations. The study sought to assess requirements in reading, writing, speaking, listening, and mathematics which, "are necessary for success both on the job and in the training program." The procedures used are:

1. Reading - required materials were assessed using the Dale-Chall and Fry Scales. Also considered were the importance of reading in the occupation and the use of technical terms.
2. Speaking and Listening - tapes were made of one-hour samples of speaking. The language was assessed for technical and formal qualities, vocabulary, and syntax. Word lists of terms were thus developed.
3. Writing - samples of written material were collected for assessing the demands of written communication.
4. Mathematics - materials were surveyed for the math content, and supervisors were interviewed.

Results of this process are shown for ten occupations in job related work and for training programs. Two examples are:

	on-the-job		training program	
	reading	math	reading	math
draftsman	10th-college	basic processes through geometry, algebra trigonometry	9th-college	basic processes through geometry, algebra, trigonometry
welder	few materials-reading of single word information	basic processes, fractions, decimals measurement	8th-college graduate level	basic processes, fractions, decimals, measurement, algebra

The final part of this survey on processes is evaluation. As we have seen, evaluation is given prominence in the models discussed. The models from Wenig and Wolansky (1972), Woodington (PDK, 61.5, 1980), Humanic Designs (n.d.), and Sticht (1975) all indicate the importance of evaluation (see especially Humanic Designs, figure 8). However, discussion on this topic is quite limited. Lusterman (1975) in his survey gives only minimal coverage. He does cite the AT & T System of four evaluative criteria, proposed for external evaluations on external programs. The validity of the program is measured by the ability of the employee to do what was taught in light of actual performance. The transferability of the program is shown by doing the task on the job, and is measured against performance criteria. Acceptance of the program is shown by the reaction of instructors or supervisors. The worth is found by measures of employee turnover, reduced error, productivity, and/or costs.

The survey also made some general points about evaluation (or "feedback"): opinions of participants are the most common source; opinions of supervisors are frequently used; rather subjective evaluation of actual performance is sometimes used; and testing of skill level is rare. Within the context of a behaviorally oriented instructional system, the apparent dearth of formal evaluative systems is surprising. The need for cost efficiency, and the other goals of training, likewise would seemingly presuppose as vigorous an assessment of effects as assessment of needs.

Woodington (PDK, 61.5, 1980) outlines some reasons why evaluation is largely neglected despite its importance.

1. Evaluation requires people who are able to do rather complicated statistical processes, representing a further cost in training.

2. Evaluation is seen as a threat, especially if the effects do not support the instruction. Programs and staff people may be placed in jeopardy.

3. Companies have yet to adopt a clear rationale for training programs, including a sense of the system of training, shown in the various models presented. If such models are used, evaluation would be seen to be an integral part of the training program.

4. Several styles of evaluation may be used: reaction, or the attitudes of participants; learning, which is usually a performance test (written); behavior, which measures on-the-job performance; and results, or the corporate benefits including employee stability, increased productivity, and cost-benefit. Woodington says that all four styles should be used in an evaluation of a program.

5. Evaluation strategies depend upon the type of organization and the training offered. Knowledge-based corporations emphasize trainee input in training (since most are already well-educated), but there is a lack of

evaluation, since most would be written tests of knowedge. Production-based firms tend to use learning and behavior measures, with little trainee input into programs which are set by corporate goals.

6. Some problems arise from the difference between in-house and external programs and differing use of measures, and with the lack of trained evaluators.

Such a list is quite similar to problems faced in schools, where evaluation may be lacking for the same reasons, lack of expertise, fear, multiplicity of styles, or differing goal structures.

Wentling (1980), however, tries to help overcome these difficulties by writing books on the subject. His stepwise approach is useful to those coping with evaluation, but he uses another style of evaluating from that of Woodington. The problem of different evaluations, and possible confusion arising from the use of various styles, is not easily addressed. Wentling uses Stufflebeam's CIPP system, showing evaluations in context, input, process, and product terms. The context component strives to define the environment, including the needs of participants and related goals. Input assesses the various ways to meet the needs or goals, by an analysis of resources for feasibility, cost-benefit, and projected effects. Process information is obtained during programs, to monitor trainee progress, to assess procedures for effects, and to identify and rectify problems which arise. Product evaluation relates the effects to goals, as well as to the other aspects of the evaluation.

Wentling also presents much information on the design of an evaluation, giving seven phases.

1. Measurement of learner performance

These measures assess trainee competencies, help in making career choices, match trainee abilities with jobs, provide information on the effects of programs, and give feedback for improvement of programs.

2. Student followup.

   These measures show the adequacy of training for job entry or performance, the effect of counseling, the relevance of job descriptions, the demand for certain jobs, and student mobility.

3. Employer followup.

   These data determine the objectives of programs, trainee performance, comparisons of trainees with others who have had different programs, the demand for job skills taught, and recommendations for program improvement.

4. Consultant team survey.

   Use of outside evaluators may provide an overview of programs, a monitoring of program relevance to goals, and a report on program strengths and weaknesses.

5. Special services.

   These data show compliances with legislative mandates, and point out effects on special populations.

6. Personnel.

   The program must be assessed in terms of the conduct of training, including instructor competency, selection of instructors, salary and promotion data, and training of trainers.

7. Costs.

   The costs are analyzed according to student-teacher ratio, use of facilities, comparisons with other programs, efficient staff usage, accountability, and scheduling.

Wentling also provides information on the constructing of measures to determine performance effects, attitude effects, and others. For instance, performance tests may be in identification of objects used, or in job performance/work sample. Attitudinal measures use such taxonomies as Bloom's to show increased personal involvement in tasks or work aspects. Wentling gives detailed procedures for constructing such measures, as well as general guidelines for evaluating programs. The fact that such help exists bodes well for rectifying the critique of Woodington. But, much more work is needed to bring evaluation into programs, and to show clearly the effects, and their relation to goals and to program implementation.

This survey of processes shows that a systems approach is evident in the literature. Authors describe program processes either collectively or individually, such as needs assessment, curriculum development, or instructional strategies. The theory behind training remains a practical, behaviorally oriented approach. But, until the training effort can be feasibly practiced as a system, it will remain as a disjointed effort, with insufficient data provided to allow for detailed presentations of needs and objectives, the most appropriate instructional practices, and a true evaluation of what has occurred. Despite historic splits between industry and education, the features of program development shown here are well within the provenience of educational theory and practice. Reminded as we are by Sticht (1975) that programs cannot be transported wholesale, there remains the fact that procedures can, showing individual program developers how to assess correctly the training program, and to put it into operation with the maximum positive effect.

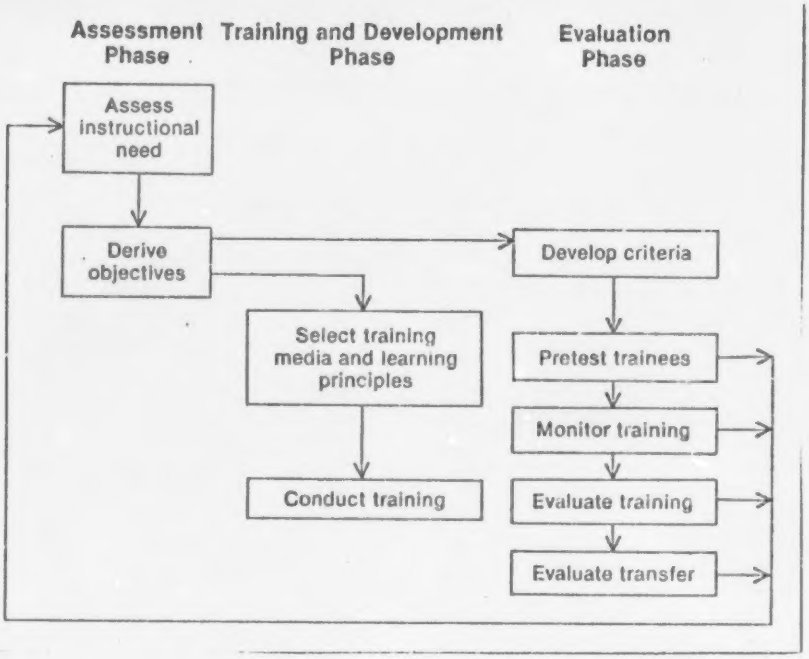

Assessment Phase
Training and Development Phase
Evaluation Phase
Assess instructional need
Derive objectives
Develop criteria
Select training media and learning principles
Pretest trainees
Monitor training
Conduct training
Evaluate training
Evaluate transfer

Figure 1: Goldstein model
Woodington (PDK, 61.5, 1980)

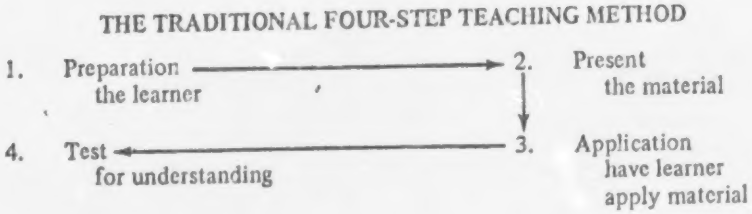

THE TRADITIONAL FOUR-STEP TEACHING METHOD
1. Preparation the learner
2. Present the material
3. Application have learner apply material
4. Test for understanding

Figure 2: Four step model
Wenig and Wolansky, 1972

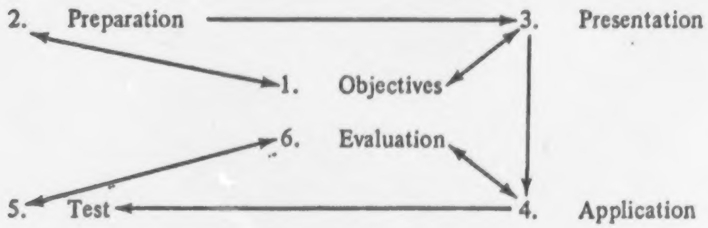

THE EXPANDED FOUR-STEP METHOD OF INSTRUCTION
(Adopted from Ford, 1970)
2. Preparation
3. Presentation
1. Objectives
6. Evaluation
5. Test
4. Application

Figure 3: Ford model
Wenig and Wolansky, 1972

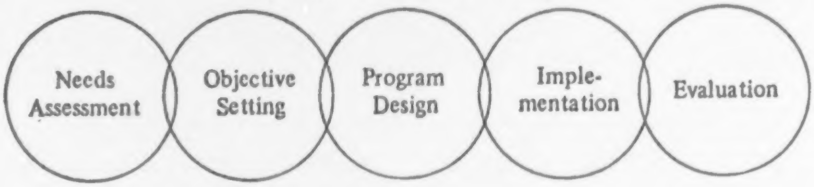

THE TRADITIONAL CONCEPTS OF THE TRAINING MODEL
(Adopted from Miller, 1969)
Needs Assessment
Objective Setting
Program Design
Imple-mentation
Evaluation

Figure 4: Miller model

Wenig and Wolansky, 1972

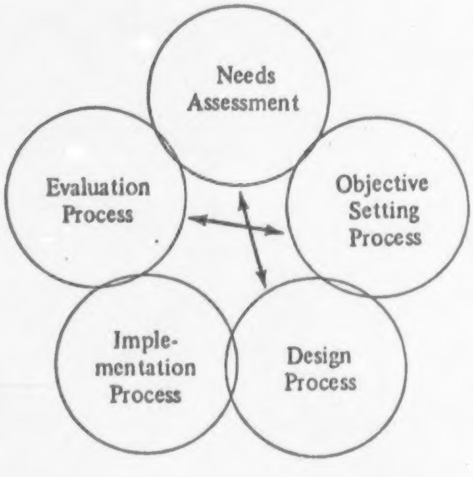

CONCEPTION OF THE TRAINING MODEL AS AN INTEGRATED PROCESS
(Adopted from Miller, 1969)
Needs Assessment
Evaluation Process
Objective Setting Process
Imple-mentation Process
Design Process

Figure 5: Miller model
Wenig and Wolansky, 1972

FOUR-PHASE TRAINING AND DEVELOPMENT CYCLE
(Adopted from Renton, 1969)

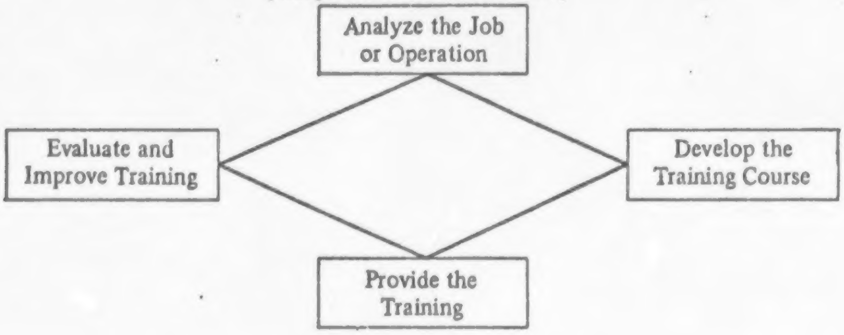

Analyze the Job or Operation
Evaluate and Improve Training
Develop the Training Course
Provide the Training

Figure 6: Renton model
Wenig and Wolansky, 1972

TRAINING ROUTE TO EXPERIENCED WORKER STANDARD ON THE JOB
(Adopted from Renton, 1969)

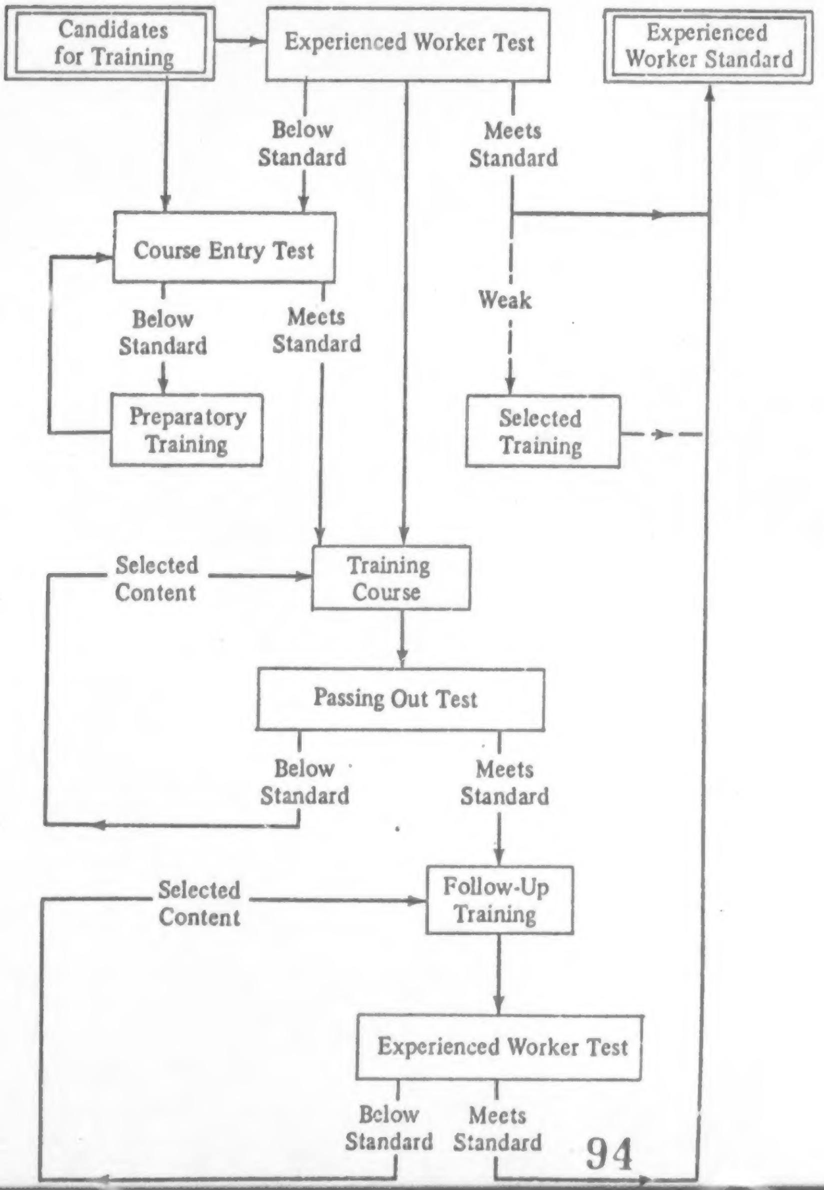

Candidates for Training
Experienced Worker Test
Experienced Worker Standard
Below Standard
Meets Standard
Course Entry Test
Weak
Below Standard
Meets Standard
Preparatory Training
Selected Training
Selected Content
Training Course
Passing Out Test
Below Standard
Meets Standard
Selected Content
Follow-Up Training
Experienced Worker Test
Below Standard
Meets Standard

Figure 7:
Renton model
Wenig and
Wolansky, 1972

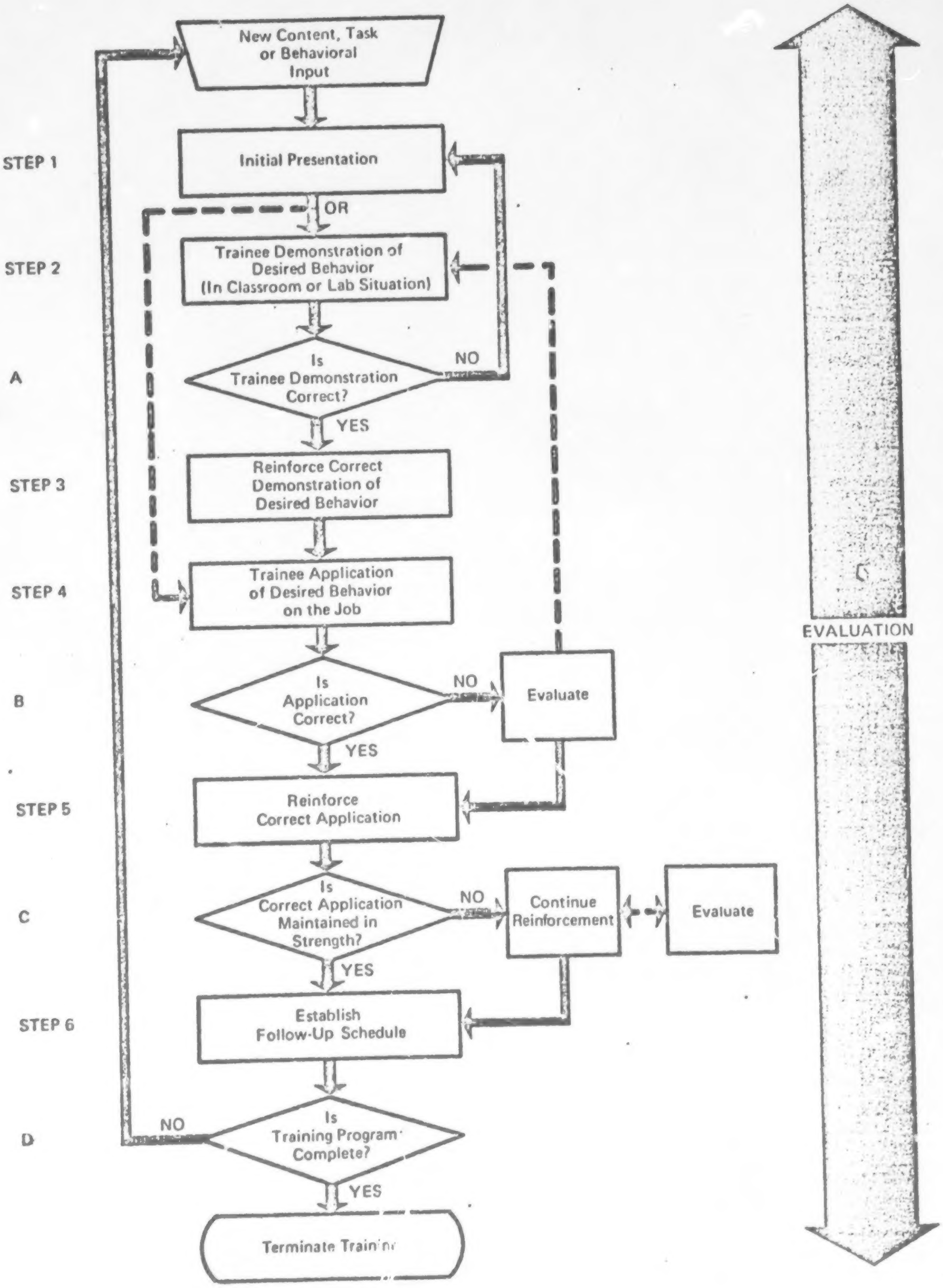
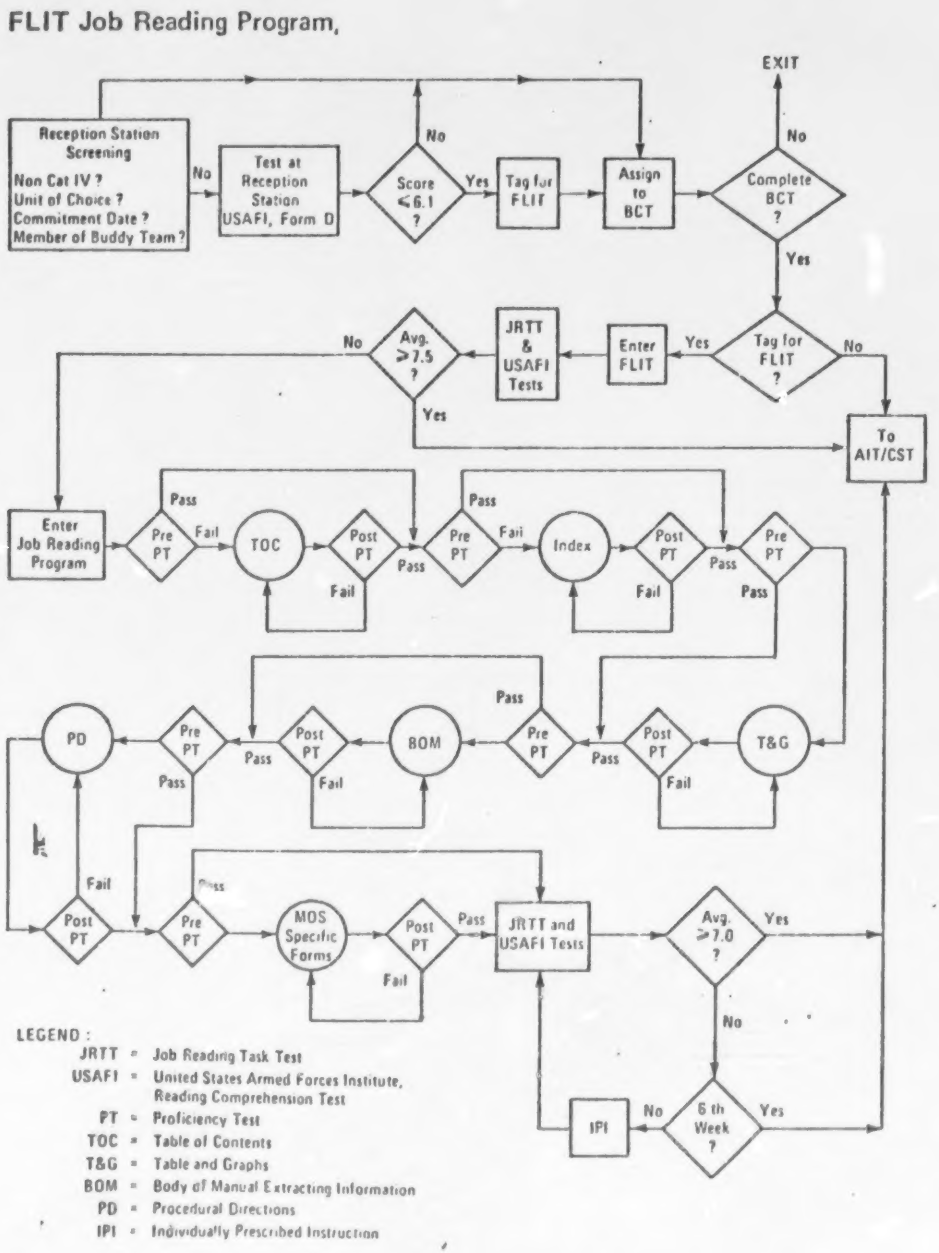

New Content, Task or Behavioral Input
STEP 1
Initial Presentation
OR
STEP 2
Trainee Demonstration of Desired Behavior (In Classroom or Lab Situation)
A
Is Trainee Demonstration Correct?
NO
YES
STEP 3
Reinforce Correct Demonstration of Desired Behavior
STEP 4
Trainee Application of Desired Behavior on the Job
B
Is Application Correct?
NO
Evaluate
YES
STEP 5
Reinforce Correct Application
C
Is Correct Application Maintained in Strength?
NO
Continue Reinforcement
Evaluate
YES
STEP 6
Establish Follow-Up Schedule
D
Is Training Program Complete?
NO
YES
Terminate Training
EVALUATION

Figure 8: Humanic Designs model (n.d.)


FLIT Job Reading Program,
Reception Station Screening
Non Cat IV ?
Unit of Choice ?
Commitment Date ?
Member of Buddy Team ?
No
Test at Reception Station USAFI, Form D
Score ≤6.1 ?
No
Yes
Tag for FLIT
Assign to BCT
Complete BCT ?
EXIT
No
Yes
Tag for FLIT ?
Yes
No
Enter FLIT
JRTT & USAFI Tests
Avg. >7.5 ?
No
Yes
To AIT/CST
Enter Job Reading Program
Pre PT
Pass
Fail
TOC
Post PT
Fail
Pass
Pre PT
Pass
Fail
Index
Post PT
Fail
Pass
Pre PT
Pass
T&G
Post PT
Fail
Pass
Pre PT
Pass
BOM
Post PT
Fail
Pass
Pre PT
Pass
PD
Post PT
Fail
Pre PT
Pass
MOS Specific Forms
Post PT
Fail
Pass
JRTT and USAFI Tests
Avg. ≥7.0 ?
Yes
No
6 th Week ?
Yes
No
IPI

LEGEND:

JRTT = Job Reading Task Test
USAFI = United States Armed Forces Institute, Reading Comprehension Test
PT = Proficiency Test
TOC = Table of Contents
T&G = Table and Graphs
BOM = Body of Manual Extracting Information
PD = Procedural Directions
IPI = Individually Prescribed Instruction

Figure 9: Flit model (HumRRO)

Sticht, 1975

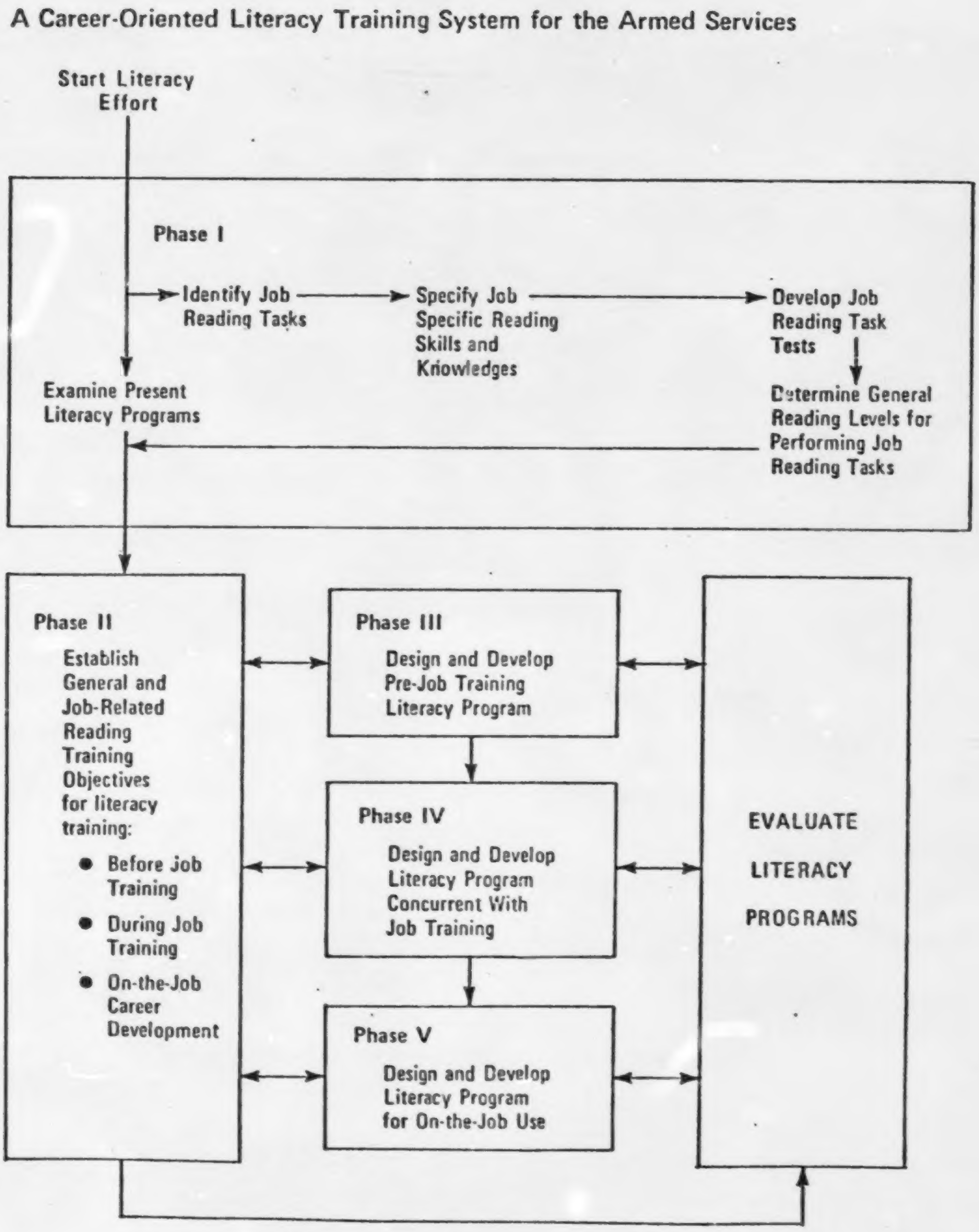

A Career-Oriented Literacy Training System for the Armed Services
Start Literacy Effort
Phase I
Identify Job Reading Tasks
Specify Job Specific Reading Skills and Knowledges
Develop Job Reading Task Tests
Determine General Reading Levels for Performing Job Reading Tasks
Examine Present Literacy Programs
Phase II
Establish General and Job-Related Reading Training Objectives for literacy training:
Before Job Training
During Job Training
On-the-Job Career Development
Phase III
Design and Develop Pre-Job Training Literacy Program
Phase IV
Design and Develop Literacy Program Concurrent With Job Training
Phase V
Design and Develop Literacy Program for On-the-Job Use
EVALUATE LITERACY PROGRAMS

Figure 10: Career literacy model (HumRRO)

Sticht, 1975 .

Concluding Comments

There is little doubt that the field of education in industry is very broad in scope. The material presented above can only begin to paraphrase the quantity of material possible to locate, and it is therefore hardly beneficial to attempt a summary of the information provided. But, it is incumbent upon even novices to the study to provide impressions given by the research. Despite the hindering factors of limited time and study, the researcher may note areas where clarification is not yet noticeable, and may attempt to work toward that ultimate goal of a personal theory and model of industrial training. In this spirit, the following comments are offered.

Industrial training is a specific type of curriculum development, and as such should be amenable to examination according to the principles of such development. In the first place, there should be a theory to direct our later efforts. Theories may be defined in several ways, but the most useful form is as a set of propositions which may provide a framework in which we analyze the processes of development and evaluate the outcomes of these processes. These propositions describe the circumstance in which we work, predict the outcomes of processes, and explain what is or will occur. We should be able to use our statements to make inferences and test them, thereby judging the quality of the theory itself.

For an initial statement of propositions in industrial training, we turn to the theories given on why training should occur (see Theories of Training). The list of goals given is to be used to elicit our statements.

Propositions

1. Companies are in business to make profits.
2. Profits are obtained by production and continued by a competitive stature.
3. Production is centered on the equipment and employees who run the equipment.
4. The employees must possess the skills, knowledge, and aptitudes necessary to run equipment, or to perform requisite tasks.
5. Competitive stature is continued by increased efficiency in production.
6. Increased efficiency demands increased skill levels and increased quality of products.
7. Increased skill level is produced by: (a) hiring skilled workers; or (b) enabling current employees to enhance their skills or knowledge.
8. Hiring of prior trained workers may necessitate some change in skills depending on individual company equipment or products.
9. Enabling current employees to elevate their skill level demands instruction.
10. Training is instruction and practice in skills associated with production tasks.
11. Companies provide training to:
    a. increase profit; and
    b. maintain competitiveness.
12. If profits are obtained from production, and if production is centered on equipment and skilled workers, then training must increase production by:
    a. increasing employee skill level;
    b. reducing error and waste; and
    c. maintaining a skilled work force.
13. If competitive stature is continued by increased efficiency in production, and if increased efficiency demands increased skill level and product quality, then training must increase

efficiency by:

a. reducing employee turnover;
b. reducing error and waste;
c. increasing employee skill;
d. enabling employees to do new or changed tasks; and
e. instilling correct attitudes in employees about the job.

There are, of course, other factors besides these in the conduct of training, such as cost-benefit and company attractiveness. If these points are in any way complete, then they form a set of guidelines for the questions one needs to ask in order to train with the company's priorities clearly in mind. The questions, then, are based on the company's views of itself and what it desires to be, and thus on what level employees should perform. Likewise, the questions need to be answered in terms of the who, what, where, when, and how as seen by the company.

To give form to this arcane discussion, it is often advisable to construct a model, showing the primary areas of questions, where each fits into the structure of training, and what the resolution of each may mean for the entire process. Using the ideas generated from such examples as those in Processes in Training, the following model is proposed (figure II). It must be noted that this is a preliminary discussion and no doubt lacks certain features of importance. As said at the outset, however, this may aid in the clarification of the training process.

The first step is Preparation. A company must know where it is before it can embark on change. Some areas of question are:

1. Will the company train and/or educate?

2. What is the common status of new employees in terms of relevant job skills?

3. What are the jobs in the company? Do they need redefinition? Is a particular status accorded to certain jobs?

4. What are the tasks within jobs? What are desired employee behaviors? What do they require in terms of skills, knowledge, or aptitudes?

5. What company organizational structure will be used in the conduct of training?

6. How does the company view its mission in enhancing employee career goals? What part does attitudes or morale play in company training decisions?

Preparation is mandatory to help eliminate the incoherent approach, or at least disjointed activities, which characterize much training. If the company knows how decisions are made, what specifically it is doing (job and task analyses), and what employees generally know beforehand, and if it sets itself a policy of training or education, then it can make decisions based on rational procedures, and not on attempted immediate remedies to problems as they occur.

The second step is Needs Assessment. The conduct of training, or the decision that training is needed, is predicated on the awareness that things could be better, in terms of production, profit, quality, and competitive stature. Needs analysis is not a first step, as it is often given or practiced, since it implies a knowledge of current practices and a vision of what may be. Just the activity of preparation may either show that things are going as smoothly as possible, or may point out needs to be addressed. Whatever the case, preparation streamlines the training process; needs assessment addresses the problems found.

The questions of needs assessment may include:

1. Are employees working at optimum skill level?
2. Do employees need retraining?
3. Do employees need pre-training to acclimatize them to the work place?
4. Is equipment the same or different as that on which employees learned skills? Is equipment available for use in training?
5. Are those who will conduct training prepared to do so?
6. Are potential trainers skilled in assessing employee needs, or advising employees on training?
7. Do facilities exist for training?
8. What are the projected costs of training? How does the company view its investment, as capital expense or investment?

Curriculum development is next. If training is found to be necessary, then the program needs to be constructed. This is done through curriculum and instruction. Curricular questions include:

1. Who produces the materials?
2. Are materials based on the tasks/jobs to be done?
3. Are there training materials already in use? What basic academic skills are needed to use them (i.e., reading level, computational level, etc.)?
4. Do new materials need to be produced, or do older materials need to be revised?

Instructional questions include:

1. Are trainers ready to instruct?
2. Have instructional methods been devised which focus on the content to be presented?
3. Do trainers need training in curriculum and/or instruction?
4. Do the instructional strategies account for the factors found in the needs assessment (facilities, costs)?

A training program may then be begun, assuming that the results of the needs assessment are addressed in the production of curricular and instructional materials. Questions for the training program include:

1. Will the training take place inplant or outside?
2. What resources exist to conduct training, either inplant or outside?
3. What procedure is used to determine the optimum training location?
4. Is education to be provided, where will it take place, and who will conduct it?
5. What incentives are given for participation by trainers or employees?
6. What support is given to employees (entry-level) while they become adjusted to the work place?

The final step is Evaluation. The importance of this to all of the other factors given cannot be disputed. Through an effective evaluation scheme, planners may learn what works and what doesn't, where changes need to be made or parts amended, and whether the process achieves the set goals of training. Several types of evaluation are needed to record as accurately as possible the effects the program had on participants. Questions relating to this area are:

1. Was the employer satisfied with the program? Did it meet the stated goals of training, and was there a noticeable payoff?
2. Were trainees satisfied? Has their job performance increased? Has the program brought them a bit closer to their career goals? Has it effected their attitudes about the job?
3. Was the cost acceptable in relation to benefit?

4. Have behaviors been affected? Have speed and mastery increased to a measurable extent?
5. Have the trainees learned the material? Can they perform at an acceptable criterion level on written tests of tasks?

This step-wise approach begins to address the innumerable questions which may arise over training. To balance this approach with more general schemes for curriculum development, we may cite Ralph Tyler's model, to point out that development projects tend to follow parallel lines. Tyler's model shows that input comes from three sources: the society; the learners; and specialists in content areas. These are used in the formation of tentative objectives. The objectives are filtered through learning theories and philosophy, after which the final objectives are written. Instruction then takes place, and the program is evaluated (cf. Ralph Tyler, Basic Principles of Curriculum and Instruction, 1949).

Adapting Tyler to this situation, we see that: studies of the society translates to corporate goals in training; studies of the learner refers to employee characteristics; and subject specialists are supervisors, curriculum developers, or managers. Learning theory is behavior oriented. Philosophy is that of corporate management.

Industrial training, then, shortens Tyler's model since several decisions which must be made in public education are already made. If two principal concepts be mentioned for training, they would be profit and behavior. One is a goal, the other the means to attain it. In our discussion, then, it must be recognized that a behavioral approach in training is the only acceptable instructional strategy, since it provides for immediate feedback, measurable performance, and practice.

One point needs to be made about attitudes. Without doubt, worker job attitudes play an important role in the success of training. Behavioral approaches tend to ignore attitudinal considerations, since the focus is upon demonstrated performance. The approach can influence attitudes, since increased proficiency may lead to increased self-esteem. But, the literature cited earlier points out that self-esteem may need bolstering before training may begin. Also, continued support may be required to reinforce performance. Much depends upon the instruction and instructor. If skills are taught as combinations of movements, then there is little area for self-esteem to grow. The employee becomes a human machine. If, however, principles behind operations are presented, then, the employee has the opportunity to transfer learning in one skill to other areas. For example, increased reading ability has far more use than only for technical materials, and simple mathematics has applications beyond blueprint conversions.

Objectives in training have been given much discussion, and a prominent place in most models, but have not been specifically cited here. While it is imperative that objectives be formed, and be amenable to behavior analysis, trying to show exactly where they would occur defeats the purpose of their formation. Objectives come from the information gathered from preparation, needs assessment, curriculum development, instruction, and evaluation, in other words, from the whole process. Of course, specific objectives for a specific training program should be devised prior to curriculum development and instruction. The point is, however, that objectives and evaluation go hand-in-hand. Both are the guiding forces behind the process: what are we doing, and how do we know when we've done it. To try and place objectives along a continuum robs us of the input from points of the process. It is the same problem as trying to show evaluation somehow connecting with other aspects of models.

Returning to the point of departure for this project, can we see an application of this paradigm to basic skills instruction in schools? In areas of such importance as reading, computation, communication, or writing, behavioral strategies appear to be beneficial. The reasons for this are: the need for students to have such skills; the behavioral notion of modular work which necessitates a coherent approach to details of curricular development; the lack of concern about attitudes, since the need is so pronounced; and a system to convert discrete basic skill delivery to the broad outlines of a school curriculum. It is permissible to note that student basic skill abilities may be more adequate than standardized test scores can measure. Evidence does suggest that abilities are not being used although students have them. Part of the instruction, therefore, must note where the appropriate speech patterns, for instance, are to be used, or where one should think in terms of computational skills. Besides the basic skills themselves, the scope of their use must be made evident.

Looking at the model already given, let us examine how basic skills instruction may fit in.

Preparation

Basic skills may be aspects both of education and training, since they involve mental process abilities, and demonstrable skill performance. Of more concern in this training model is the performance.

Job or task analyses may best be viewed in terms of recent efforts to construct minimal competencies in skills. If this is done properly, then all of the modules to be used in instruction will have been titled, at least. It is important to note where skills blend, or where two or more skills may be joined in single presentation. It is also important to show what behaviors are acceptable, and at what criterion level.

Organization is a central requirement. If training is to be effective, then it cannot be viewed as another "subject" only. Basic skills must be taught in every class, using modules developed from the specific subject itself. This means that every teacher becomes a trainer in basic skills.

Needs Assessment

The primary need to be addressed is the discrepancy between what students know already and what they have to know. Both of these must be measured. The second aspect is more difficult (what they have to know), but standard performance measures will typically give acceptable criterion levels, based on students' career goals. It is here also that student attitudes toward the use of certain skills must be assessed.

Equipment is not a severe problem, since delivery will usually be by demonstration and practice. AV equipment may be used, but paper and pencil is the most efficient device.

Trainers are teachers. They already possess certain skills in teaching, but must be made cognizant of the aura which basic skills must cast about the entire curriculum. Every class becomes a basic skills center.

Costs and facilities are not typically problems, since no additional space is needed. Time may interfere, unless teachers show that their regular instruction may be diverted into basic skills lessons also.

Once criterion levels have been established and the needs are assessed, the program should determine if any students are in need of pre-training, that is, a program designed to elevate their skill level to that of the rest of the student population. It may also be necessary to give pointed instruction on the necessity of having a specified skill level, in terms of job entry and daily living.

Curriculum and Instruction

The form of materials should be modular, to permit some flexibility. This may cause severe administrative problems, and require massive bookkeeping efforts to ensure that all students complete all modules. However, if the rather typical lock-step approach is used, then students may become bored since, as mentioned above, the evidence suggests that students can do more than they will do.

Instructional methods must be standardized to permit the greatest flexibility between classes. This requires that teachers be given training, if needed, in the strategies used. It will also permit interchange of materials among teachers, again contributing to the flexibility of the program. Materials already in use must be reexamined for applicability.

Training Program

The program itself will be a series of modules, created by consensus of all teachers. There must be one authority, for keeping instruction on track, keeping records of progress, and assessing student status.

Support is needed both for students and teachers. Personalities must be minimized in this effort, since conflict here will undermine the entire scheme. It is as if the faculty will become the trainer, and students the employees. Within the strictures of a school program where students move about, the school is the workplace, and teachers are the unified trainer. There can easily be problems in this loss of individuality so support must continue throughout the program.

Evaluation

The criterion levels of the objectives (or competency tests) form the measurable assessment of performance. Other testing may be used as needed.

The school must note the progress of students, and the outcomes in terms of performance with comparisons as needed.

The students should be questioned for their perception of the program, to determine their satisfaction with the arrangement, and the change in their attitudes about the use of skills.

Behaviors and learning are part of the assessment attached to each module. Speed, mastery, or other relevant criteria may be used to elevate the effectiveness of the program.

Results of these assessments must be recycled into the other stages. Modules may need revision; pacing may need change; teachers may need instruction; or students may need encouragement.

The model can be adapted for school use. However, the goals of education and those of training are disparate, and thus great effort is needed to build bridges between the eclectic, humanistic educational structure and the mechanical, performance-based training model. But, if the participants can see the efficacy of varying instruction to suit the content, or varying their thoughts to fit the instruction, in this one area, at least, then the program may provide the long-term remedy needed to counter the long-term build up of basic skill neglect.

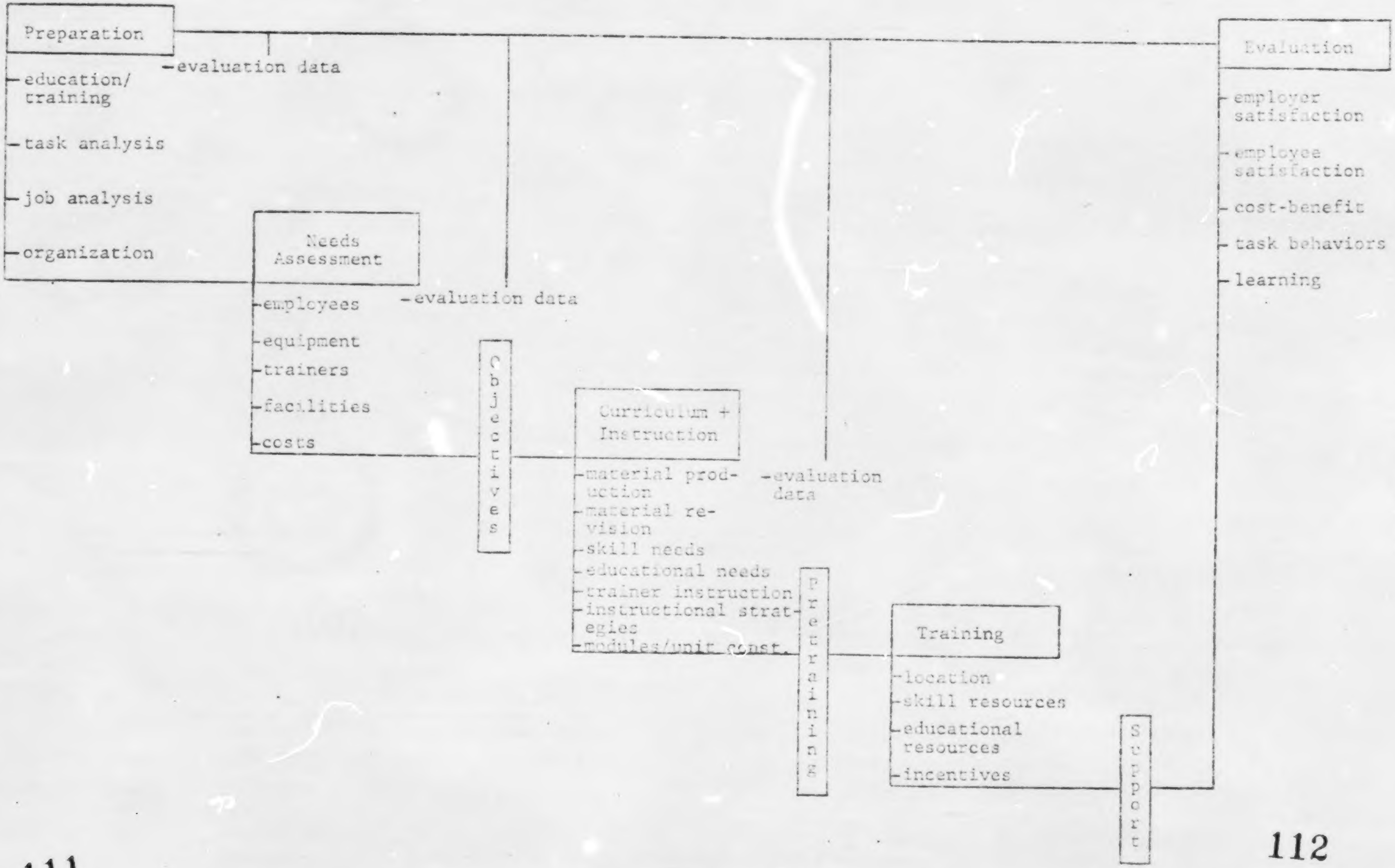

Preparation
-education/training
-task analysis
-job analysis
-organization
-evaluation data
Needs Assessment
-employees
-equipment
-trainers
-facilities
-costs
-evaluation data
Objectives
Curriculum + Instruction
-material production
-material revision
-skill needs
-educational needs
-trainer instruction
-instructional strategies
-modules/unit const.
-evaluation data
Pretraining
Training
-location
-skill resources
-educational resources
-incentives
Support
Evaluation
-employer satisfaction
-employee satisfaction
-cost-benefit
-task behaviors
-learning

figure 11

APPENDIX

1. A set of four essays written mid-way through the project on aspects of training. Some of the material is included in the report above.
2. The mid-term evaluation of the project.

Flexibility

Industrial training is most commonly, at least for production tasks, a combination of formal classroom instruction and on-the-job training. However, the amount of classroom time spent may vary from as much as 30% of the total training time to less than 5%. Such classroom instruction is commonly a "vestibule school", where senior employees, or, rarely, outside instructors, explain the workings of machinery using models identical to those in the plant proper. A rationale for this is reduction of malfunction in actual plant machinery caused by inexperience. Beyond the classroom, trainees are usually paired with a senior employee who explains the duties and procedures of the position and requisite jobs. It would appear that, in most companies, employees are simply expected to pick up useful knowledge about jobs.

The jobs in industry are customarily given a progression, or "job ladder" with advancement along the ladder in a given sequence. Since such ladders are unique to companies, little pretraining for them is possible. Employees must find out what skills are needed for the next "rung" and accordingly learn the skills.

Within such a framework of rather loose instruction or informality of skill instruction, the problem of flexibility becomes apparent. Employees know precisely what they should be doing for advancement, and so incentive to learn more is hindered. If a company should close, or if significant change in machinery or technology should occur, then the employee is in a difficult position, working to gain skills for which there is no need. Because of the job ladder, the seniority system, and other such factors, there is no provision for an industrial Rennaissance Man.

The connection between this state of affairs and general versus specific education is apparent. Efficiency, that watchword of the business world, demands that employees be trained with as little loss to the company as possible. This loss would entail the time of the trainee, the time of the "tutor", and damage to machinery operated by unskilled workers. In a school setting, much more needs to be learned than a set of skills for a specific job. The efficiency of this is really not to be questioned, for inculcation of beliefs, facts, processes, and attitudes is a lengthy task, with the goal being, more or less, the ability to function in society. The industrial worker has to produce, and that means knowing the job and how to do it. The student in school probably does not know the job, that is, has not made a career choice, therefore cannot know requisite skills, and therefore must learn a great deal, partly for a future occupation and partly for the ideal of good citizenship.

Another aspect of industrial inflexibility is the job turnover rate. While it may be possible to train employees in a variety of skills, disregarding the next step on the ladder, a company may be reticent about expending the costs of training upon one who will very likely leave. Narrowness of training is, then, a type of company self-protection, not that the company has great secrets to protect, although some may, but more that it can realize a return on its investment in the trainee almost immediately. A job holder who leaves creates a vacuum in the company, a vacuum which would be filled by another trainee, thus more cost. The training given to the former employee is largely wasted, thus a loss of return. Since inter-company subsidies are not common, the passing of skills, in terms of people, between companies represents a loss of revenue. Thus, trainees must be prepared and go on the job quickly, in order for the company to realize as much profit as possible from their instructional time.

In education such thinking is not evident, although there are pressures which make it a pervasive, if tacit, factor. Immediacy is not a concern of general education. The building of concepts and processes, as well as values, is time-consuming, and the goals of education are remote in time. While some work is done which makes gestures at immediate benefits such as literacy, consumer math, or vocational training, the goals of education remain couched in terms of a lifetime growth.

A third facet of flexibility is credentialing. Employees, even to be considered for employment, are usually required to possess some education. Such prior training may be explicit, such as a diploma from high school or demonstrated reading or math ability at a certain grade level, or implicit such as requiring the employee to fill out forms or take an employment test. Whether such requirements are necessary, or even the process by which employers arrive at them, are obscure. Schools have little to compare to this, since education is compulsory. The only similar programs are those based on academic ability, such as gifted programs, honors, or tracking. The end result seemingly means the removal of the best from the mainstream.

Employees are quite cognizant of such programs.

Finally, flexibility can be inferred from the skills needed to learn a job vis-à-vis to do a job. Especially in reading, learning involves comprehension, such as word meaning, recognition of main themes, drawing of inferences, or critical thinking, while doing is reference oriented, including the use of visual aids, written directions, use of reference materials, and recognition of significant facts. It should be clear that education tries for the former and employers the latter. Nowhere is the distinction more profound between education and industry.

With these thoughts in mind, and the general conclusion that industries are rarely flexible and education almost always so, the identification of skills training processes and their translation to basic skills delivery must include critical evaluation of the divergent philosophies behind education and business. In one, we see a reliance on a pragmatist - rationalist tradition; in the other, a humanist, possibly perennialist, view. Before translation may begin, we must be aware that differing priorities will heavily influence methods, and ultimately goals. The final conclusion is, we must be wary of short-term gain at the expense of long-term growth.

Organizational Climate

The section above, Flexibility, implied, in part, that schools and businesses are different in the way they view people, and thus in the way they operate. When juxtaposed, the characteristics of businesses and schools clearly show the differing conceptions given.

American companies can be characterized by:

1. short term employment

2. individual decision making
3. individual responsibility
4. frequent evaluation and promotion
5. explicit, formal evaluation
6. specialized career paths
7. segmented concern for people.

Schools in general along the same series can be characterized by:

1. long term employment
2. individual decision making
3. individual responsibility
4. infrequent evaluation and promotion
5. explicit, formal evaluation
6. non-specialized career paths
7. segmented concerns for people.

Other schools, deemed successful in one writer's view, are given these characteristics:

1. long term employment
2. collective decision making
3. individual responsibility
4. infrequent evaluation and promotion
5. explicit, informal education
6. non-specialized career paths
7. holistic concerns for people.

While these characteristics are given primarily from the teachers' perspective, they can generally be applied to students. They can provide a screening mechanism for the work of a school or of a program, that is, by checking how the school/program views its clients.

The society in which the business or school operates contributes greatly to the sense of mission of the organization. In our present society, we look for some organization for social control. We need a vehicle to present the values we hold more or less in common as a country. As Durkheim said, the urbanization of a society causes the breakdown of prior controls, and the void is primarily filled by the occupational group. Thus, where one works provides stability within society and promotes the values which bind societies together.

Looking now at our business characteristics, which can be said to agree with notions about our country? Possibly the ones on individual action, although these are in doubt. The list for successful schools, however, shows a differing perspective, while schools in general are mixed.

Much can be said about the differences, including the fact that schools which are successful share many characteristics with Japanese corporations. But, if more proof be needed that schools and businesses do not share similar philosophies, as translated into practice, these lists bear out the frequent conflict between these organizations. Students are caught in the middle.

In the examples given earlier, and in comparisons with the successful school and the business, there are clear points of divergence. Time given to training and reasons for specific training are related to the notion of short-term employment and specialized career paths, as well as a segmented concern for people. Schools have much longer to work with students, who are generally in non-specialized career paths. Likewise, there is more of a concern for the whole person, rather than the functionary aspect only.

Further, businesses expect a frequent turnover rate, and concentrate on simple job instruction. Schools have the reverse, long tenure and general instruction. Credentials are part of hiring and promotion in business, where, as the characteristics list shows, evaluation and promotion are formal and frequent. Schools have no requirements for admission, and, although evaluation and promotion are constant, do not have the frequency or even the formality of business promotions. The only possible correlation is between businesses who promote by seniority, and schools which give social promotion.

Finally, trainees learn to do jobs, while students learn to learn jobs. A look at English courses shows the comprehension aspect of reading, a lifelong goal, while business reading is more reference oriented. This is part of the present study.

The divergent character of business and schools is often a hindrance to employment, where the transition is apt to be difficult. Thus, the translation of programs from one training activity to an educational one necessitates translation also to the differing goals of the two institutions. As the study progresses, it might be beneficial to note how schools have used business programs, and how the above translation has been effected.

Culture

The Organizational Climate section shows two sets of values, which may be considered overt expressions of two cultures. Besides this, cultures enter into discussion of the trainees or students. Schools have a cultural type which approximates that of students, or at least parents' and a board's idea of student ideal culture. That culture would roughly correspond to the humanist/perennialist tradition cited earlier.

Trainee culture is likely to be at variance with the business culture. Whether the trainee comes from a student or outside background, the process of enculturation into the business world is similar to forcing one to live in a strange land. This is evident by the problems employers have with new employees, who know little of demands such as punctuality, speech, dress, or manners. Other new employees may be better prepared, that is, their environment may match that of business in several regards. Nevertheless, it is not uncommon for employees to be stunned by the values or culture of the workplace.

Academic abilities are part of the culture of both worlds. But, where one fosters, the other demands. Even entry to business can be based on credentials of possibly dubious import. It is clear that sudden change involves emotional support as well as sufficient preparation to handle requisite tasks. Several businesses have indeed adopted mechanisms to insert workers gradually through classroom training, heavily supervised on-the-job training, and tutoring. Such practices facilitate the transfer from student/citizen to employee.

Literacy

From the standpoint of the above ideas, functional literacy involves those skills needed to perform a task which has been imposed upon an individual by an external agent. That agent may be course requirements, manuals of operation of equipment, governmental forms, or myriad others. It should be noted, however, that no single standard applies to all situations, and training involved in comprehension skills, for instance, may have little bearing on research skills. Again we see the distinction between learning a job and doing a job.

At this point, procedural questions arise, asking how does one determine the ability needed to do a job (grade level), what sort of skills are needed to read the material, or do calculations, or how does one determine the reading level of standard material. One such device to answer these questions was created by HumRRO. Their steps are:

1) determine the jobs to be studied
2) determine essential job reading material, usually by asking incumbents to cite five sources used in the past month
3) select passages of 150 words from these sources
4) measure an individual's comprehension of the passages
5) scale passages by grade level
6) construct a criterion level for pass/fail on comprehension tests.

The method devised by HumRRO to find the grade level of passages is Forcast. This is a simple but effective method, involving only that one count the number of one syllable words in a passage of 150 words, divide that number by ten, and subtract the result from twenty. That is:

$$GL = 20 - \frac{\#\text{ one-syllable words}}{10}.$$

The range of Forcast is 5 to 12.9.

References (selected)

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INTERIM EVALUATION

OHIO COUNTY SCHOOLS

310 PROJECT

PROTOTYPES FOR TEACHING BASIC SKILLS

IN

BUSINESS & INDUSTRY

The interim evaluation of Ohio County Schools' 310 Grant is arranged according to the stated objectives of the project.

Progress toward stated objectives.

1. Identify existing business and industry with exemplary employee training components.

The bulk of work to date has concentrated on this objective. At last count, ten books, twenty-five monographs, and twenty-seven articles have been read on the topic of employee training. Twenty-two individuals or organizations have been found which may have information on the topic, and most of these have been contacted for further sources.

A primary problem encountered at the outset is the inability of corporations to provide specific process information on training. A C & P Telephone director of a learning center was politely adamant that training processes cannot be disseminated. Corporations spend much time and money, using expert advice, to create their training programs. They are understandably reluctant to give away what they have developed. For other, smaller businesses, much training is on-the-job with a "buddy system" as the most preferred. Vestibule schools and a bit of classroom work are also used, but OJT is the primary vehicle. This relates to employee turnover, where businesses do not wish to supply help to others and so train with a specific job in mind to the exclusion of general or survival training.

The only specific programs found are those of HumRRO for the armed forces, and Humanic Designs Corporation for an outline of "how to do it". Many programs have been found in capsule descriptions which omit processes. It is hoped that further contacts will provide some specifics of training, but the proprietary nature of businesses preclude much beyond summary descriptions.

2. Analyze exemplary business and industry training models.

The analysis of models has been undertaken with the limited information available, and with a new sense of directions in training in mind. The specific and general models give clues to the psychology of the training experience and the courses the experiences may take. One may opt for analysis of a job and define training according to the smallest task elements. This is a totally behavioral approach. One may also examine extant training materials and analyze the appropriateness of the material in such areas as its reading level, sequence, continuity, and completeness. One then may examine trainees' reading levels and understanding of the material. A discrepency between the materials and the trainees' level of comprehension would show the need for revision of material or upgrading of trainees' abilities.

Such an analysis may prove to be the most salient outcome of the project, in terms of material and student analysis, and in the directions which interventions may proceed. Part of this analysis necessitates contact with local, compliant firms who would participate in model programs along the lines given above. Such participation would provide major information for objective 1.

3. Consolidate process and material finding into new training model for basic skill adaptation.

As mentioned above, the types of information which are available necessitate a re-definition of the thrusts of the project. The emphasis on basic skills is understood, but the types of programs to be developed are somewhat changed. Rather than a model or models of delivery based on industrial models, the project will seek to define the processes of industrial training and devise a series of diagrams to aid either education of personnel or industrial planners in creating models. In other words, process information rather than set models, with points for divergence based on need, will be provided. Such process information will be of greater value to all concerned, since it will allow for a number of differing types of programs rather than a single model.

4. Establish a portfolio to include model and target groups.
5. Develop procedures for dissemination of portfolio on a local and national level.

The final two objectives have yet to be addressed specifically, but some initial planning has been done. With an emphasis on processes, the project increases the possible recepients of training. In this way, comparisons may be made between groups depending on site of training (school or industry) and specificity of training (general or specific or job related).

Delivery will include presentation of the processes to organizations already involved in such work, such as the National Manpower Institute, The Conference Board, The ERIC system especially that for vocational and adult learning in Columbus, and others. The market is large and the distribution centers are available. Dissemination, then, should pose no problems.

Evaluation of progress toward objectives

Evaluating the progress of the project, in keeping with its objectives, is best analyzed according to the process used. The first task was identification of source material, which is still going on. This was done through a computer literature search of ERIC, ABI/ARM, and INFORM, in the Dialog and Lockhead data banks. This material was collected and read as were relevant literature citations. Books were obtained through a hand search of card catalogues in three libraries, the primary one being West Virginia University. Articles were found through the Education Index and other such indices. Other material was obtained on conversation with trainers associated with West Virginia University and practitioners such as those at C & P Telephone, Westinghouse, and Allegheny Conference on Community Development.

The next step was reading the material and forming a list of contacts. This culminated in a series of letters to organizations or individuals involved in manpower training. At the same time, a report was written on four issues in the field, to give further definition and awareness of pitfalls to participants (copy enclosed).

The current state of the research is contact with local firms who may request aid in skill development, or instructional material development. This will solidify the processes found to date and provide a proving ground for them.

Other information

The primary obstacle to research has been the reticence of firms to share their materials. While articles or monographs cite training, the details of content or process are lacking. This understandable and justifiable reticence precludes much work in creation of models or in their dessemination. It should be evident that if firms did disseminate, their models would be in the literature already.

The subtle shift from model to process should cause no trouble, since it will expand the possibilities of the research and the potential clients. It is hoped that the processes identified or created will provide businesses with a number of options with which to upgrade their training.